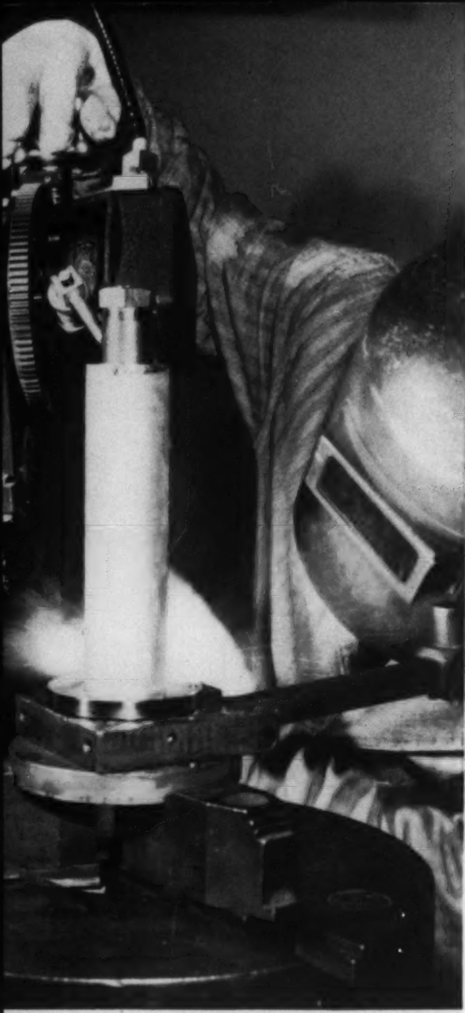
STEEL

The Metalworking Weekly

DECEMBER 12, 1960

A PENTON PUBLICATION



Choose the Right Shielding Gas

Designers are turning more and more to exotic, hard-to-handle alloys for standard and special products. That means greater use of welding processes that require some type of gas shielding. Your choice of argon, helium, carbon dioxide, or a combination of gases can be the difference between high quality, low cost welding and failure to compete. An Air Reduction Co. expert evaluates available gases for consumable and nonconsumable electrode processes. He discusses the combinations you'll need to produce top quality welds in a wide variety of metals. A checklist will help you make the right choice. See Page 78.

Capital Spending Slide Continues

FOREIGN ROUNDUP NO. 2

Europe: Market Still Strong, But U. S. Firms Find Competition Tougher

Eddy Currents Measure Thickness Of Nonconductive Coatings on Metal

Outlook Bright for Thin Tin Plate In Clash with Aluminum Cans

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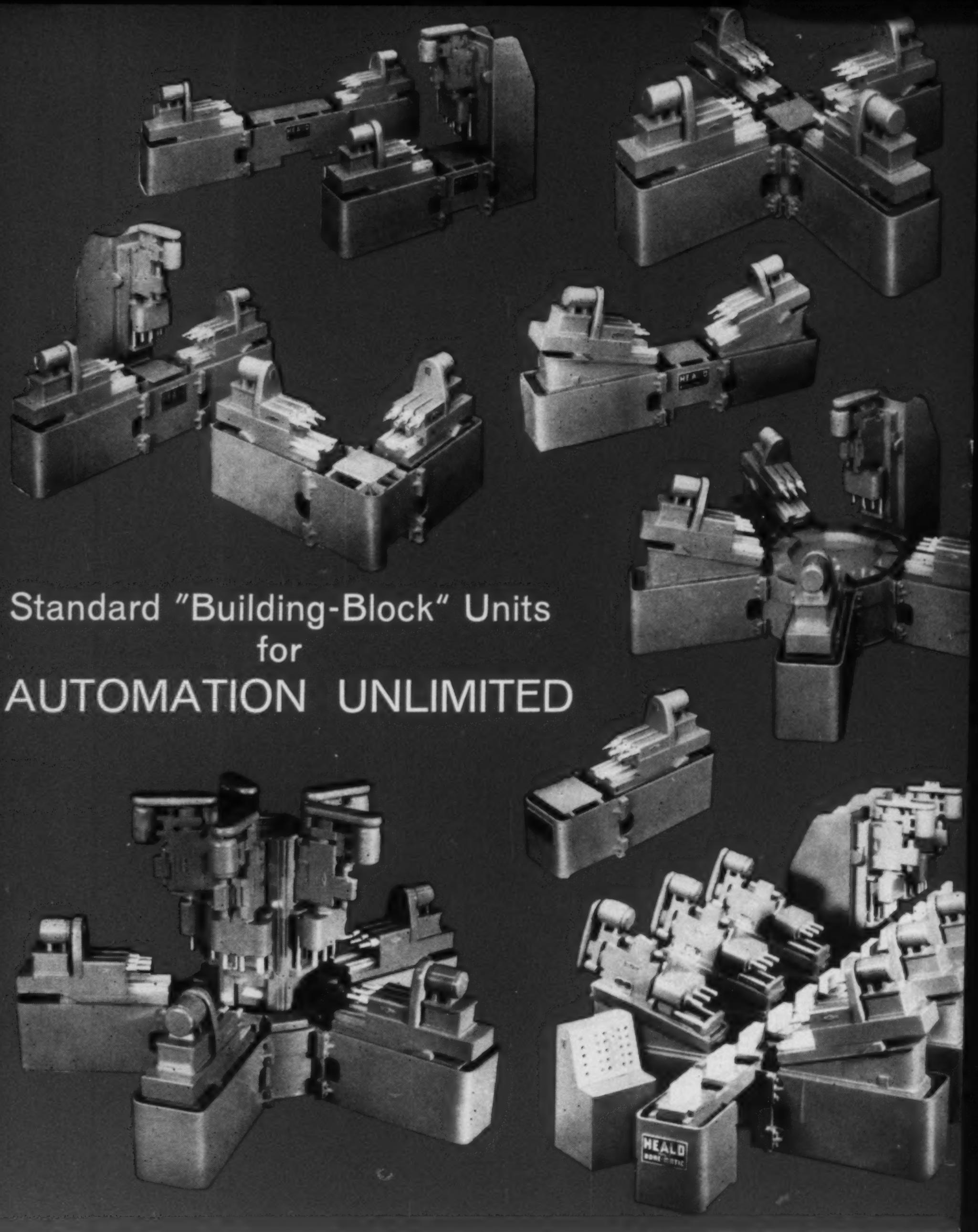

As these scale models show, Heald's new line of standard "building-block" units can be combined in virtually any desired arrangement for single or multiple station automated production equipment. Slide units and Borizers can approach the work vertically, horizontally or at an angle, to perform any desired drilling, boring, reaming, tapping, probing, facing or grooving operations within their range and capacity.

The flexibility of these standard units provides maximum versatility in meeting your specific automation requirements—simplifies even major job changeovers by facilitating retooling, removal, relocation or addition of work stations—and safeguards your investment by substantially reducing losses from obsolescence.

Your Heald engineer will be glad to show you how this "building-block" approach can solve your automation problems from rough to finish.

It PAYS to come to Heald

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.
Worcester 6, Massachusetts
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HEALD ®

This Week in STEEL

The Metalworking Weekly
December 12, 1960 Vol. 147 No. 24

Capital Spending Slide Continues

$34.9
Billion
Planned for
1st Qtr, 1961

That's how much (seasonally adjusted annual rate) industry plans to spend for plant and equipment, says the Commerce Department. Down $700 million from the current quarter, the outlays continue the decline started last spring. Durable goods spending plans, however, show a modest increase for '61's first period. Declines are expected in outlays by the railroads, other transportation industries, and the public utilities. Despite the downtrend, 1960 will still turn in the second highest capital outlays in history—$35.74 billion vs. 1957's record $36.96 billion. PAGE 45

European Sales Battle Gets Tougher

Aggressive U. S. firms will continue to find markets for their goods in Western Europe despite tougher competition. U. S. sales to that area were up 50 per cent in the first half of 1960 compared with the same period of 1959. The outlook for 1961 is cheering. Exporters report inquiries and orders are rising. PAGE 55

Eddy Currents Measure Coating Thickness

Checking nonconductive coatings 0.125 in. thick on a metal surface within plus or minus 5 per cent of accuracy is now possible. General Electric Co.'s Re-entry Vehicle Dept., Philadelphia, has developed a test instrument for that purpose that uses eddy currents. The device is in regular use on a line that produces a space re-entry vehicle. PAGE 84

Continuous Buttweld Mill Modernizes Pipemaking

New, continuous pipemaking facilities are turning out buttweld pipe at the Lorain (Ohio) Works of National Tube Div., United States Steel Corp. The mill replaces obsolete bell welding facilities. It will turn out 237,000 tons of pipe annually, in diameters of 1¼ to 4 in. Coiled skelp is welded into a continuous strand and sent through a preheater and heating furnace. Then it is roll formed, welded, and reduced to its final hot size in a series of mill stands. PAGE 86

Outlook Bright for Thin Tin Plate

Although the aluminum can threat hasn't reached alarming proportions yet, steelmakers figure they're in for a real battle. To offset aluminum's biggest sales pitch—less weight means lower freight and handling costs—they're developing thinner, stronger, lighter tin plate. The coil of Ferrolite tin plate (photo) reflects the image of the man who played a leading role in its development: Dr. Robert B. Mears, U. S. Steel's assistant vice president-applied research. PAGE 109

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Index available semiannually.

STEEL is also indexed by Engineering Index, 29 W. 39th St., New York 18, N. Y.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

We Make Them All

Bethlehem makes flanged-and-dished heads to meet virtually every requirement: ASME Code, elliptical and standard flanged-and-dished. Also flanged-only, dished-only, shallow-dished, double-dished, and heads for special requirements.

Bethlehem heads are available in diameters up to 165-in.—and in thicknesses from 14 gage to 3-in. We also produce standard manhole and hand-hole saddles, covers and fittings, as well as heads with flued openings. A number of sizes of ASME Code flanged-and-dished heads are stocked for prompt delivery.

HOW TO REDUCE COSTS BEFORE YOU ORDER

A number of suggestions that may help you to reduce costs are contained in our folder "Pertinent Facts on Purchasing Flanged and Dished Heads." Factors that govern the price of heads are described, and a list of the required data for orders and inquiries is included. Ordering from our stock sizes at Sparrows Point, Md., may save you time and money; a full list is contained in the folder. A copy is yours for the asking at any Bethlehem sales office, or write to us direct at Bethlehem, Pa.

Steel

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. . . economy
. . . versatility

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

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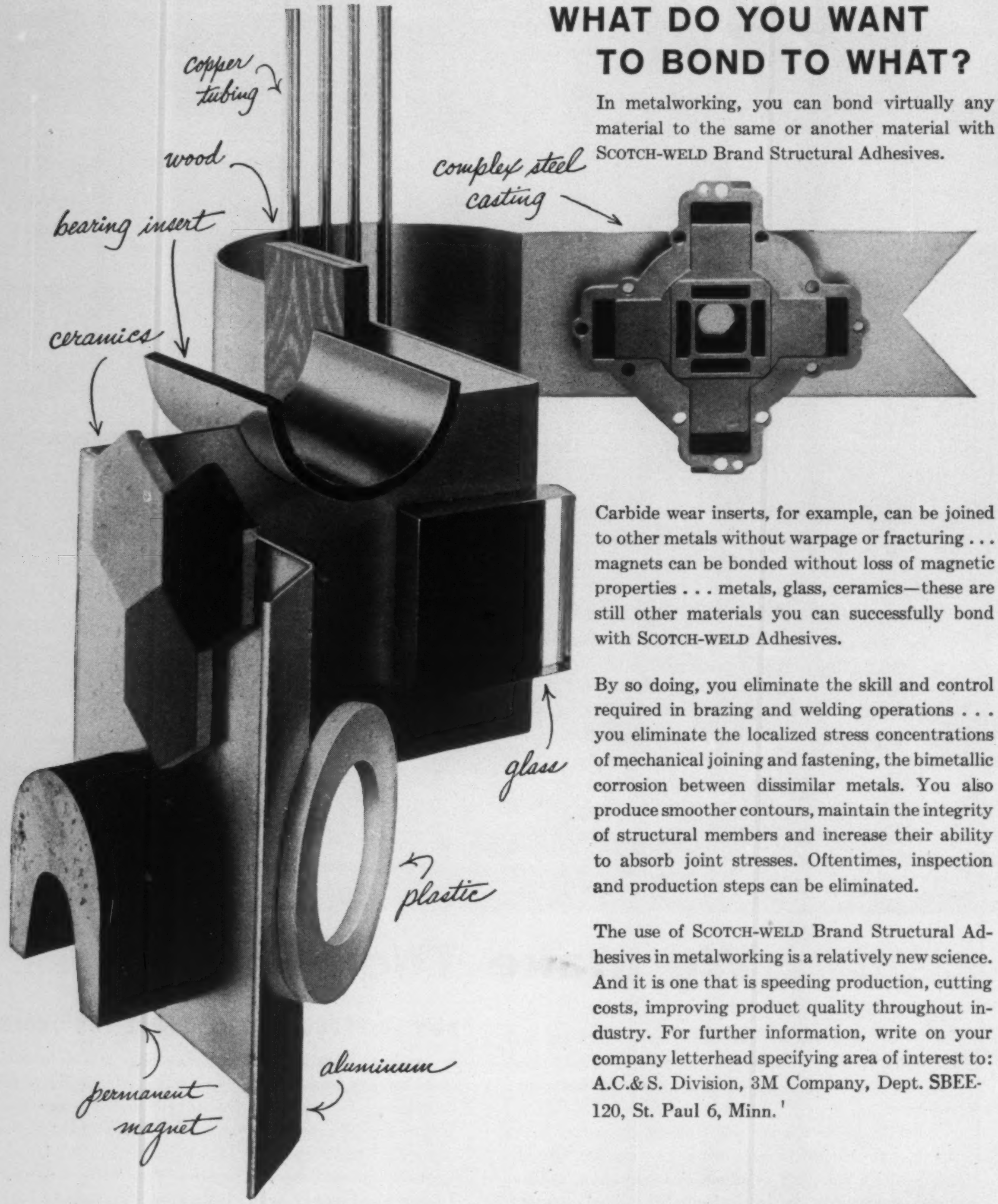
WHAT DO YOU WANT TO BOND TO WHAT?

In metalworking, you can bond virtually any material to the same or another material with SCOTCH-WELD Brand Structural Adhesives.



Carbide wear inserts, for example, can be joined to other metals without warpage or fracturing . . . magnets can be bonded without loss of magnetic properties . . . metals, glass, ceramics—these are still other materials you can successfully bond with SCOTCH-WELD Adhesives.

By so doing, you eliminate the skill and control required in brazing and welding operations . . . you eliminate the localized stress concentrations of mechanical joining and fastening, the bimetallic corrosion between dissimilar metals. You also produce smoother contours, maintain the integrity of structural members and increase their ability to absorb joint stresses. Oftentimes, inspection and production steps can be eliminated.

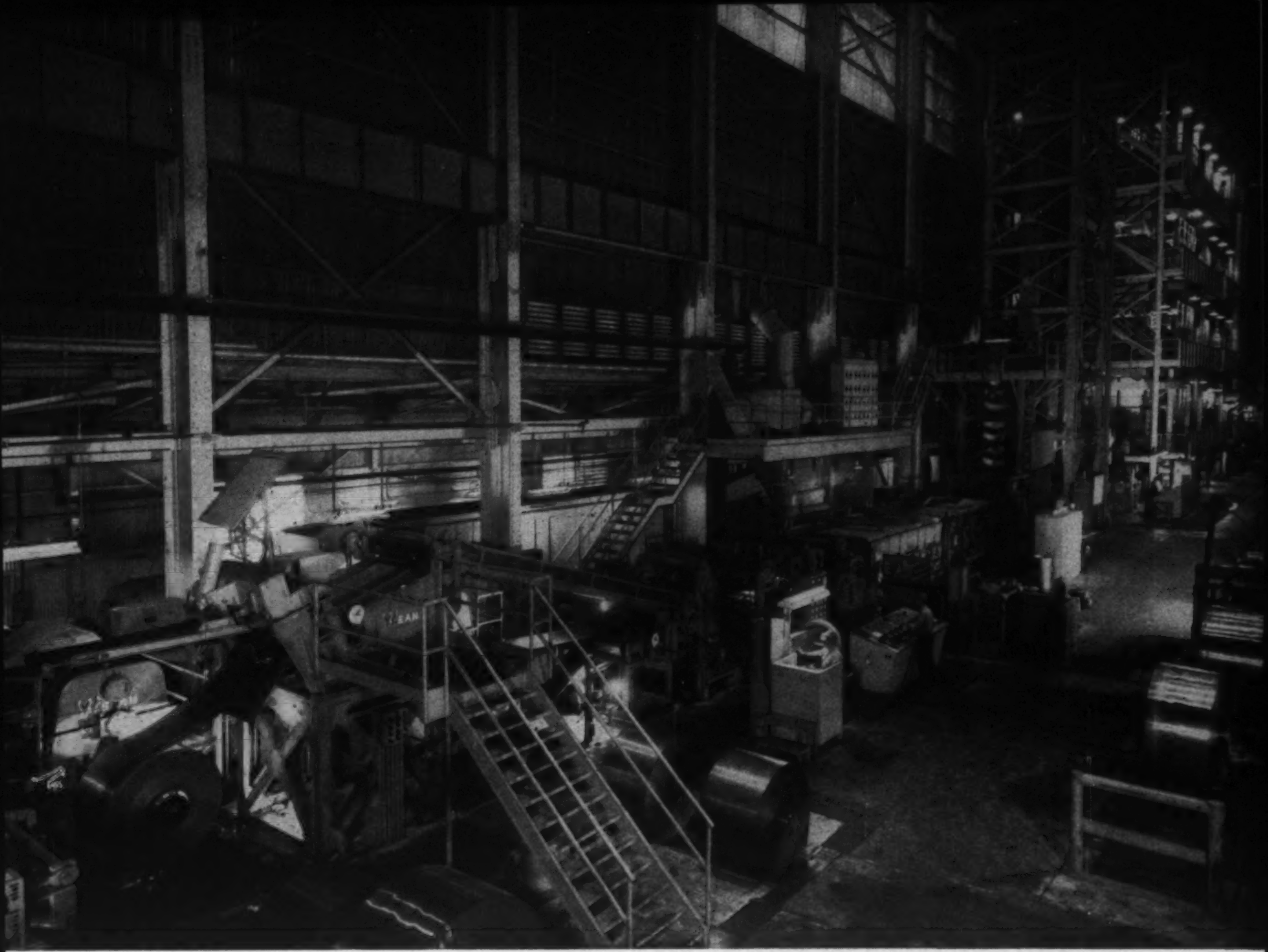
The use of SCOTCH-WELD Brand Structural Adhesives in metalworking is a relatively new science. And it is one that is speeding production, cutting costs, improving product quality throughout industry. For further information, write on your company letterhead specifying area of interest to: A.C.& S. Division, 3M Company, Dept. SBEE-120, St. Paul 6, Minn.

ADHESIVES, COATINGS AND SEALERS DIVISION

MINNESOTA MINING AND MANUFACTURING COMPANY

. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY



J&L adds modern Wean Annealing Line as major part of tin plate expansion

Recently installed at Jones & Laughlin Steel Corporation's Aliquippa, Pennsylvania plant, this high-speed continuous annealing line represents a major step in J&L's tin plate expansion program. The line is designed to operate at speeds up to 2000 fpm, and it can handle coils weighing up to 50,000 lb with a maximum O.D. of 85".

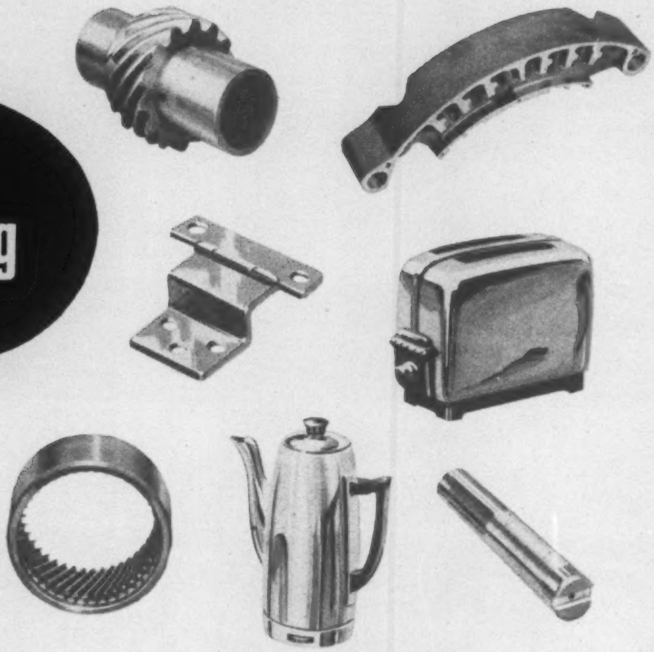
Strip tension is controlled within the major zones of the line by six precision bridles. The bridle controls are interlocked to provide optimum operating tensions in the looping towers, cleaning zone and furnace. This accurate tension control, coupled with other design features, assures positive tracking of the strip throughout the length of the line.

Off-gauge end scrap is removed at the entry end of the line by a novel system of shifting uncoilers, with a scrap reel located outside of the line. Short sections of scrap are joined by a traversing spot welder in order to build up coils, which facilitates scrap handling.

Thirty-one years of partnership with the steel industry and specialization in continuous steel processing facilities give Wean pre-eminent experience in this field. Whether your planning involves tin plate processing, galvanizing, cleaning or pickling facilities, Wean will be able to "creatively engineer" the equipment to meet your requirements.

WEAN

THE WEAN ENGINEERING COMPANY, INC. • WARREN, OHIO



Have a Metal Cleaning Problem

Detrex Engineers Have Been Coming Up With "Cost Saving" Answers for 30 Years

Every metal cleaning operation has its own particular problems—but they're seldom new to the Detrex engineer. With 30 years of experience, he can produce the right formula to insure maximum productivity and economy in your operation.

He will analyze your product, the type of soil to be removed, the proper equipment and cleaning agent needed, the space and manpower required—every factor that bears on the problem.

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Depend on DETREX for Every Metal Cleaning and Processing Need

- PERM-A-CLOR NA (Trichlorethylene)
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- Industrial Washer
- Phosphate Coating Compounds
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Write for your free copy of Dr. C. E. Kircher's informative paper: "Solvent Degreasing—What Every User Should Know."

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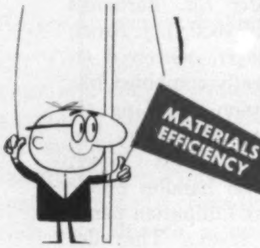
STEEL

Servicenter

Please direct all correspondence to attention of Ed Service, STEEL, 1213 W. Third St., Cleveland 13, Ohio.

December 12, 1960



Sounding Taps For a Series

Next week, the editors will lower the banner that's been flying over our Materials Efficiency series for 13 installments. The final article, "Materials Efficiency—Management Gets It," will be co-authored by Associate Managing Editor John Morgan and Associate Editor George Howick.

The other day, John was called on by a vice president and a district manager of a management service firm. The gentlemen voiced disappointment. They hadn't been interviewed for the series. John pointed out that they were not part of metalworking, but, knowing we learn from others, he used information about the company in a speech the next morning before the semiannual meeting of the Malleable Founders Society.

Fast Track

George had an interview at Minneapolis-Honeywell Corp.'s Aeronautical Div., Minneapolis, that could be classified under: "How editors like to be treated."

After George outlined his mission, company officials went into their act. In one office, four men gave excellent individual presentations, complete with charts, graphs, and tables, all related to their roles in a company program. Then George was whisked out a side door, into a car, driven around the plant, and ushered into another door to view the theory in practice—the production facility where the techniques were used. Result: A dozen interviews in 5 hours. Something of a course record.

Credit Where Credit is Due

Before the banner is furled, we salute other STEEL staffers who contributed to the 1960 Program for Management; notably, Machine Tool Editor Bob Huber, Metallurgical Editor Ed Case, and Art Editor Tom Bryan.

Evidence of Success

The Production Efficiency series won a certificate of merit (industrial publication classification) in *Industrial Marketing* magazine's 22nd annual Editorial Achievement Competition for Business Publications. More about that next week.

One of our yardsticks for reader acceptance is volume of reprint requests. So far, the Production Efficiency series has drawn 889 letters with requests for 10,553 reprints. The Materials Efficiency series is at the 335 letter mark with 5001 reprints sent out. If you'd like to have complete sets of the articles, send your request to Editorial Service, STEEL, 1213 W. Third St., Cleveland 13, Ohio.

Incidentally, here are some letters from readers:

Our Pleasure, Sir

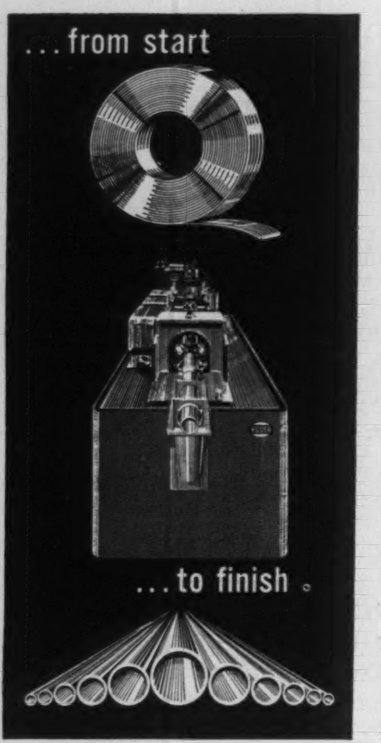
Galen E. Andrews, vice chairman, National Committee for Professional Development, National Association of Purchasing Agents, and purchasing agent, Barnes Drill Co., Rockford, Ill., writes: ". . . It is indeed a pleasure for many of us in purchasing, who have been reading articles in STEEL for years, to . . . read articles such as your Materials Efficiency series. My compliments. The series has been worthwhile."

Due in 1961

Right now, the editors are wrapping up final plans for our 1961 Program for Management. It will be outlined in our Jan. 2, 1961, Yearbook. Watch for it.

Perspective

Gracing Page 121 of this issue is *Miss Julie*, a beautiful, trim model that's reminiscent of a bygone era. She's the pride of J. W. Barnard Jr., advertising manager, Ohio Seamless Tube Div., Copperweld Steel Co., Shelby, Ohio. Here's Mr. Barnard, rigging a boom on her bow. That's



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A Yoder engineer can help you realize remarkable savings in the manufacture of ferrous or non-ferrous pipe or tube. He can show you how present Yoder Pipe or Tube Mill owners are increasing production, lowering over-all manufacturing costs and reducing downtime through use of Yoder Mills.

If your products require pipe or tubing from 5/16" to 26" diameters, Yoder Pipe or Tube Mills and accessory equipment can help you produce your product more efficiently to meet today's competitive markets.

In addition to Pipe or Tube Mills, Yoder engineers and builds a complete line of Slitting equipment and Cold Roll-Forming Machinery.

For complete information on Yoder Tube Mills . . . send for the fully illustrated, 64 page Yoder Tube Mill book . . . it is yours for the asking.

THE YODER COMPANY
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YODER PIPE AND TUBE MILLS (ferrous or non-ferrous)

right, *Miss Julie* is a scale model steamboat (3.5 mm to 1 ft), a composite in miniature of three boats that once plied the Ohio River.

Since he started making models 22 years ago, uncounted miniatures of airplanes, boats, and trains have taken shape under Mr. Barnard's skilled hands. In the summer of 1959, J. J. Arntz, the firm's assistant sales manager, conceived an advertising campaign which neatly combined Mr. Barnard's vocation and avocation. Working afterhours in his den-workshop and garage, Mr. Barnard, helped by his assistant, Corliss Cooper, and Mrs. Eileen Workman, who handles public relations in advertising, built six Lilliputian panoramas which you've seen in STEEL. They depicted phases of the construction, agriculture, and automotive industries, as well as exploratory drilling, a balloon launching, and the toughest of all, the detail laden stern-wheeler.

Testimonials to their craftsmanship came from visitors who, seeing a large picture of the construction scene, asked about the project's locale. A perspective jarring photo was reposed to show Mr. Arntz's hand placing a tiny crawler tractor in the background of the setting.

Customer comments to salesmen indicate that the campaign is an attention getter. Some readers even want to obtain kits. Everything, except the trees and the doll-like figures (adaptations of commercial castings), was made from scratch.

Will the series be continued? Mr. Barnard says they are developing another one with much the same flavor, but it's too early to talk about it now.

You Can Win $1000 This Month . . .

. . . in STEEL's Usership Idea of the Month Contest. Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—December, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted—you **will win $500.**

There's more . . . you will win an additional $500 if you furnish written proof that you accomplished your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month award.

Please identify your letters as Usership entries. They will be judged by a committee of STEEL's editors. All letters become STEEL's property.

You can enter as many times as you wish. Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. **Deadline for this month's contest is Feb. 1, 1961.**

. . . Fluid Power news

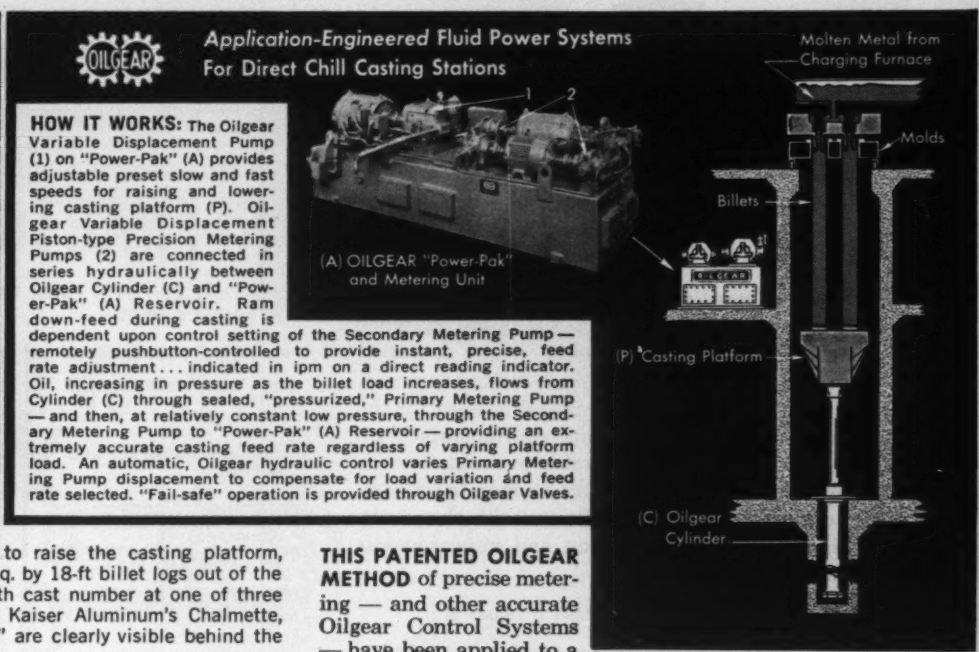
REPORT NO. 11,805
CASTING FEEDS NOT AFFECTED BY LOAD VARIATIONS

From Oilgear *Application-Engineering* Files

HOW OILGEAR SYSTEMS IN KAISER ALUMINUM PLANTS AID DIRECT CHILL BILLET CASTING PRODUCTION

USER: *Kaiser Aluminum & Chemical Corporation*

PROBLEM: To supply direct chill billet casting platform power and control systems for production of a major portion of the 1,050,000,000 lb of aluminum consumed annually by domestic extruders. Direct chill billet quality — avoidance of internal cracking, homogeneity, grain structure fineness and orientation — depends on a smooth, unvarying, precise platform feed rate, careful control of pouring speed and temperature, cooling rate, and other variables to prevent atmospheric oxidation and impurities. Up to 32 billet logs over 18 ft long are to be produced in a single cast. POWER AND CONTROL SYSTEM REQUIREMENTS: 1. Remote pushbutton control of all functions. 2. Rapid platform traverse up and down. 3. Infinite "down" feed rate selection — unvarying regardless of casting platform load increase; chatter-free — unaffected by off-balance platform loads. 4. "Fail-safe" — insuring completion of a cast in event of power failure. 5. Must be simple, and assure long, trouble-free, dependable service.


OILGEAR
Application-Engineered Fluid Power Systems
For Direct Chill Casting Stations
1
2
(A) OILGEAR "Power-Pak" and Metering Unit
Molten Metal from Charging Furnace
Molds
Billets
(P) Casting Platform
(C) Oilgear Cylinder

HOW IT WORKS: The Oilgear Variable Displacement Pump (1) on "Power-Pak" (A) provides adjustable preset slow and fast speeds for raising and lowering casting platform (P). Oilgear Variable Displacement Piston-type Precision Metering Pumps (2) are connected in series hydraulically between Oilgear Cylinder (C) and "Power-Pak" (A) Reservoir. Ram down-feed during casting is dependent upon control setting of the Secondary Metering Pump — remotely pushbutton-controlled to provide instant, precise, feed rate adjustment . . . indicated in ipm on a direct reading indicator. Oil, increasing in pressure as the billet load increases, flows from Cylinder (C) through sealed, "pressurized," Primary Metering Pump — and then, at relatively constant low pressure, through the Secondary Metering Pump to "Power-Pak" (A) Reservoir — providing an extremely accurate casting feed rate regardless of varying platform load. An automatic, Oilgear hydraulic control varies Primary Metering Pump displacement to compensate for load variation and feed rate selected. "Fail-safe" operation is provided through Oilgear Valves.

Above: Rapid traverse is used to raise the casting platform, bringing, in this case, the 6-in.-sq. by 18-ft billet logs out of the casting pit for identification with cast number at one of three direct chill casting stations at Kaiser Aluminum's Chalmette, La., Works. Direct chill "molds" are clearly visible behind the "marker."

SOLUTION: Oilgear's patented Feed and Control System provides accurate volumetric metering of pressurized oil over a 200:1 pressure range, and a 100:1 feed range. Installations consist of an Oilgear Variable Displacement Pump direct-connected to an electric drive motor, two Oilgear Precision Variable Displacement Metering Pumps direct-connected to a double-end synchronous electric motor — all mounted on a custom-built reservoir base (A); and Oilgear piston- and ram-guided, chatter-free, *Custom-Quality* Cylinder (C); Oilgear Valves and Controls . . . all thoroughly, carefully *Application-Engineered.*

USER REPORTS — "Where accumulating load on the platform varied oil pressure from 50 to 1500 psi, and the rate of metering was preset anywhere from 50 to max. cipm, *there was no measurable change on the preset rate of casting feed during any portion of the stroke."*

There has been NO major maintenance on these heavy-duty Oilgear Systems operating continuously in Kaiser Aluminum plants across the nation — some for over 7 years — and still "going strong."

THIS PATENTED OILGEAR METHOD of precise metering — and other accurate Oilgear Control Systems — have been applied to a wide range of applications in many industries where varying loads must not affect the speed of linear movement or hydraulic motor rotation. Carefully Application-Engineered Oilgear Systems — also used extensively on extrusion presses . . . aluminum foil laminating machines . . . stretching, forming, drawing and spinning presses . . . can-closing and filling machines . . . metal briquetting presses . . . ladle tilting, ingot manipulators, strippers, and scalpers — have all proved Oilgear equipment's traditionally long life, prompting users to state —

"for the lowest cost per year . . . it's Oilgear!"

For similar practical solutions to YOUR linear or rotary motion problems, call the factory-trained Oilgear Application-Engineer in your vicinity. Or write, stating your specific requirements directly to . . .

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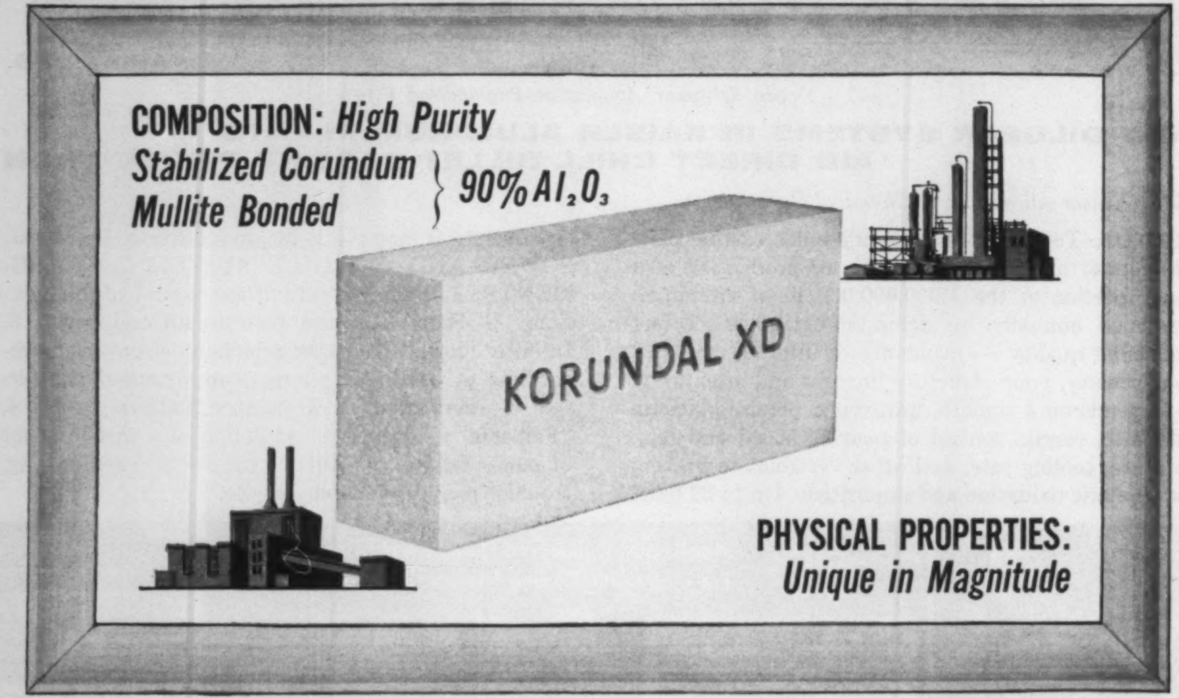
Phone: Mitchell 5-6715 . . . Direct Distance Dialing Code 414

PICTURE OF A MARVELOUS REFRACTORY



COMPOSITION: *High Purity Stabilized Corundum Mullite Bonded* } *90% Al_2O_3*

PHYSICAL PROPERTIES: *Unique in Magnitude*

by HARBISON-WALKER REFRACTORIES CO.

The extraordinary combination of individual superior properties of KORUNDAL XD is not matched by any other refractory. To builders and operators of high temperature furnaces, the following engineering information will prompt unusual interest for the fulfillment of extremely rigorous requirements. With KORUNDAL XD used in vulnerable positions in various furnaces, it becomes possible to operate economically under more severe conditions with the resultant higher rates of production and improvements in quality of products.

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Refractoriness (Al_2O_3-SiO_2 binary curve)	3500°F.
Apparent Porosity (unusually low)	14–15%
Highest Mechanical Strength	
Cold Crushing Strength, psi	15000+
Transverse Strength	
Modulus of Rupture, psi	2600+

UNPRECEDENTED PHYSICAL PROPERTIES

Reheat Test
At 3140°F.
% Linear Change — no shrinkage with slight tendency to negligible expansion

PROPERTIES OF PRE-EMINENCE AMONG REFRACTORIES

Load Test, 100 psi — 4 times load of A.S.T.M. Test	
% Linear Subsidence	
At 3000°F.	0.0
Transverse Strength Test	
Modulus of Rupture at 2500°F.	Ave. 1800 psi
Panel Spalling Test	
% Loss	
Preheat — 3000°F.	0.0

IMPORTANT BENEFITS FROM PARTICULAR PROPERTIES FOR SPECIFIC USES

PROPERTIES EXTRAORDINARY	USES
GREAT HIGH TEMPERATURE STRENGTH	Tunnel Kiln Car Tops Setter Tile Piers High-Heat Release Furnaces
RESISTANCE TO IMPACT AND ABRASION	Heating Furnace Bottoms Rotary Kiln Discharge End Blocks and Dams
RESISTANCE TO EROSION — LOW POROSITY AND PERMEABILITY RESISTANCE TO PENETRATION BY GASES AND SLAGS	Molten Metal Tapping Blocks Recuperator Tubes Funnels Induction Furnaces
CHEMICAL COMPOSITION — CORROSION RESISTANCE	Vulnerable Parts of Glass Tank and Silicate of Soda Furnaces Immunity to Oxidizing and Reducing Atmospheres
THERMAL SHOCK RESISTANCE	Property of Great Importance in Many Applications

With KORUNDAL XD of splendid workmanship now commercially available in virtually any desired shape, it is serving many established uses with improved results. Numerous other important applications will suggest themselves for conditions of extreme severity and its use could contribute materially in the development of new industrial processes.

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can a ball bearing carry?

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Federal

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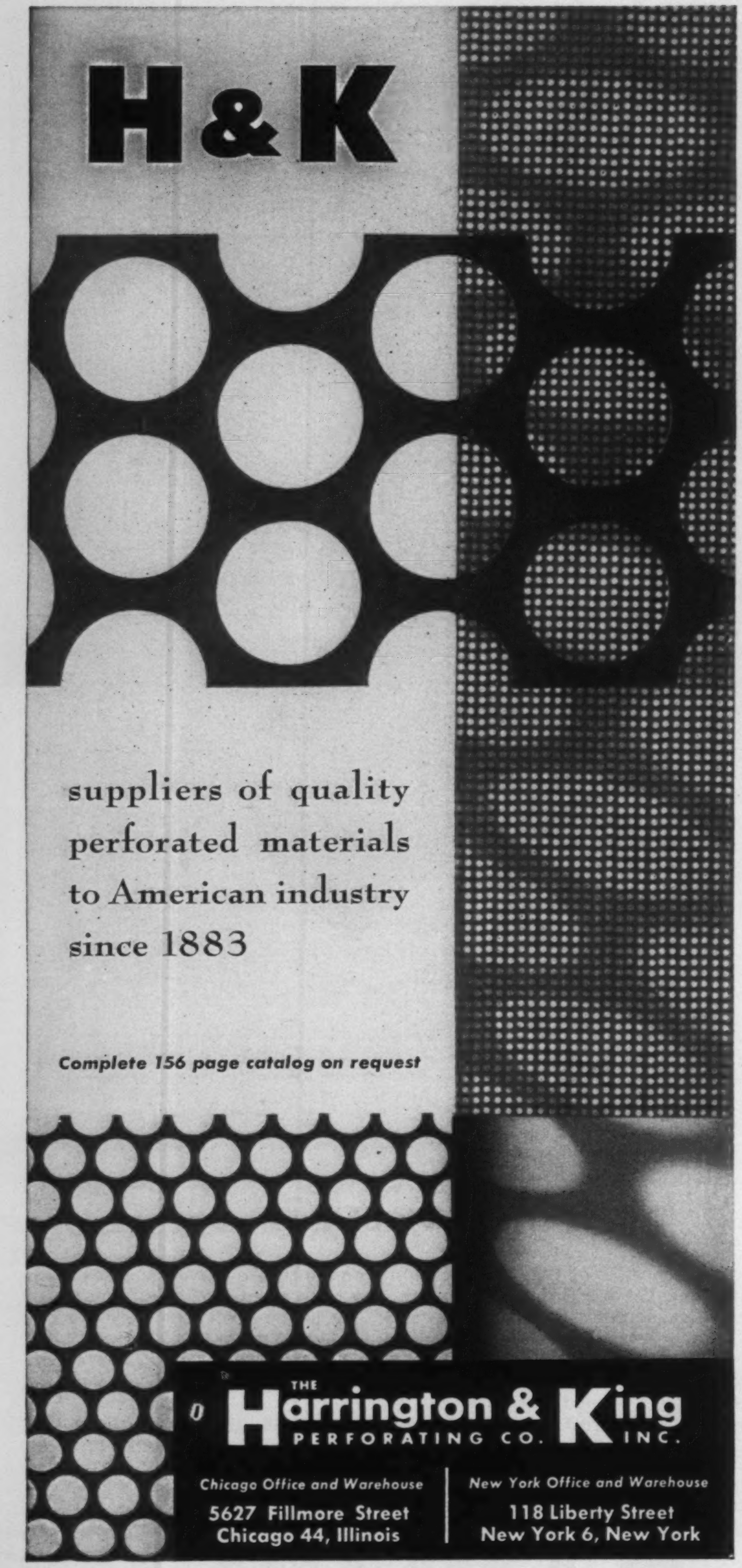
One of America's largest ball bearing manufacturers

FEDERAL ON FILM—A 16 mm. color sound film takes you through our 400,000 sq. ft. plant. Loaned free. Just ask for it.



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Chicago 44, Illinois

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New York 6, New York

CALENDAR
OF MEETINGS

Jan. 8-11, Institute of Scrap Iron & Steel Inc.: Annual meeting, Fontainebleau and Eden Roc Hotels, Miami Beach, Fla. Institute's address: 1729 H St. N.W., Washington 6, D. C. Assistant executive vice president: William S. Story.

Jan. 9-13, Society of Automotive Engineers Inc.: International congress and exposition, Cobo Hall, Detroit. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: Joseph Gilbert.

Jan. 10, Hoist Manufacturers Association: Annual meeting, Statler Hilton Hotel, Cleveland. Association's address: 1 Thomas Circle, Washington 5, D. C. Executive secretary: J. H. Peritz.

Jan. 17-19, Instrument Society of America: Winter instrument-automation conference & exhibit, Sheraton-Jefferson Hotel and Kiel Auditorium, St. Louis. Society's address: 313 Sixth Ave., Pittsburgh 22, Pa. Executive director: William H. Kushnick.

Jan. 18, The Metallurgical Society of AIME: Third AIME mechanical working conference, Penn-Sheraton Hotel, Pittsburgh. Society's address: 20 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

Jan. 18, Steel Plate Fabricators Association: Annual meeting, Lago Mar Hotel, Ft. Lauderdale, Fla. Association's address: 105 W. Madison St., Chicago 2, Ill. Secretary: J. Dwight Evans.

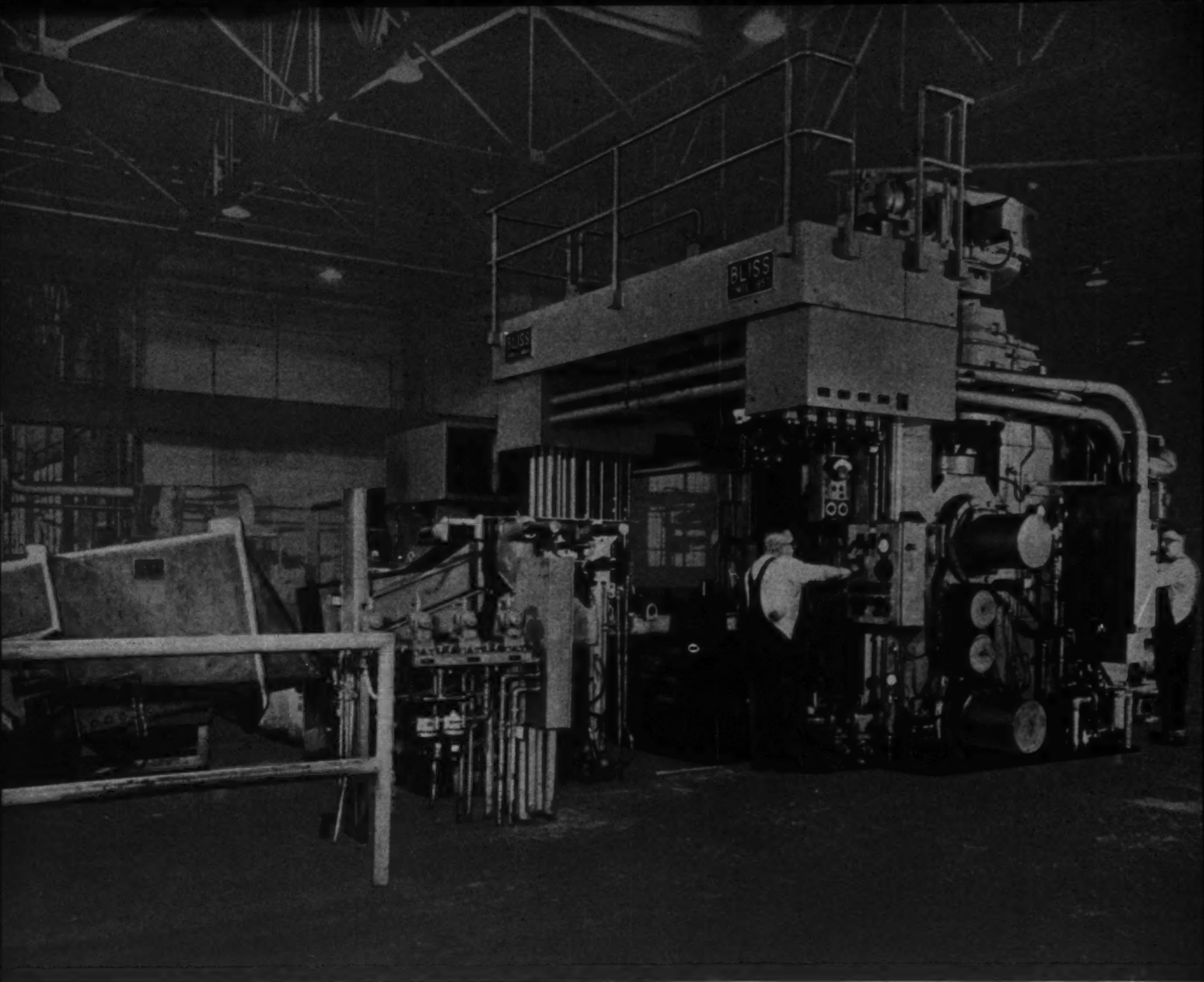
Jan. 19, Engineers Joint Council: Annual meeting, Biltmore Hotel, New York. Council's address: 29 W. 39th St., New York 18, N. Y. Secretary: L. K. Wheelock.

Jan. 19-21, Southern Industrial Distributors Association: Mid-year meeting, Palm Beach Biltmore Hotel, Palm Beach, Fla. Association's address: 1626 Fulton Bank Bldg., Atlanta 3, Ga. Secretary-treasurer: E. L. Pugh.

Jan. 23-24, Industrial Heating Equipment Association Inc.: Winter meeting, Dearborn Inn, Dearborn, Mich. Association's address: Association Bldg., Washington 6, D. C. Executive vice president: Robert E. Fleming.

Jan. 23-26, Plant Maintenance Show: International Amphitheatre, Chicago. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Jan. 30-Feb. 3, American Society for Testing Materials: Committee week, Netherland-Hilton, Cincinnati. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Thomas A. Marshall Jr.



Western Electric feeds a varied diet to its new Bliss cold mill

Each year, about 30 million pounds of metal pass through the new Bliss cold breakdown mill at Western Electric's Hawthorne, Illinois plant. They include both ferrous alloys like Western Electric's Permalloy and a wide variety of non-ferrous materials such as brass, nickel silver and phosphor bronze. No matter what they are, the mill reduces them with ease and precision.

The 12" and 28" x 18" mill is capable of reducing non-ferrous metals from an incoming thickness of .410" to a finished gauge of .060" and the special ferrous materials from an incoming thickness of .360" to a finish gauge of .125" at speeds up to 300 fpm."

Bliss supplied more than a mill to Western Electric. To meet the customer's particular needs, it designed and built the unique auxiliary equipment, including an inside and outside runaround conveying system, a special turn ender and a specially designed feed unit permitting off-center rolling of narrow material. "Tailoring" mills and equipment to the specific needs of the user is a Bliss specialty. For other examples of this "know-how" in mill design and installations, write for our 84-page Rolling Mill Brochure, Catalog 40-B.

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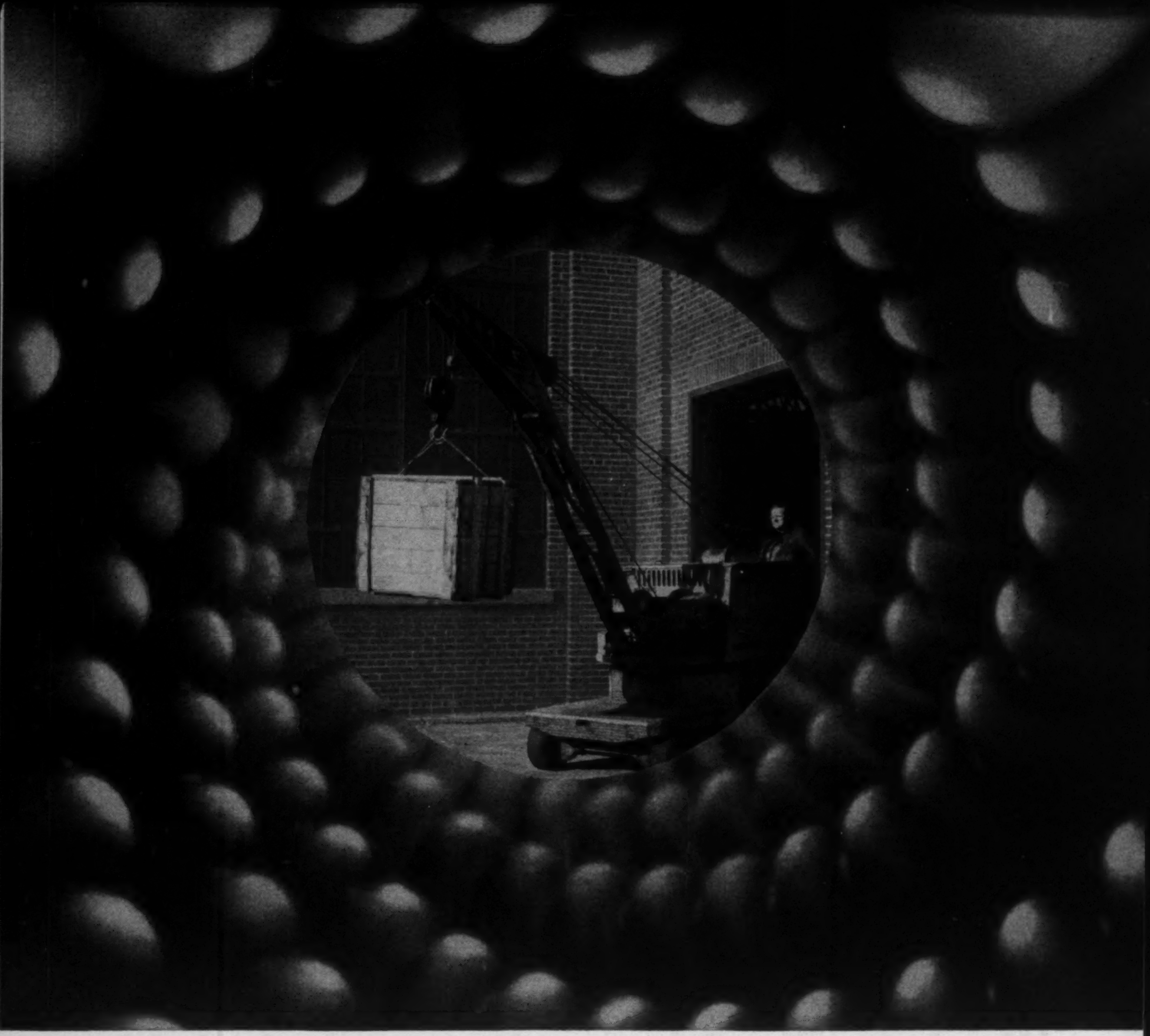

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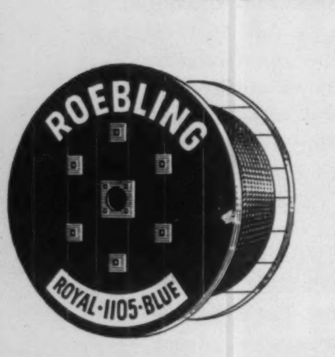

ROYAL BLUE: *We put a lot of work into it—You get a lot of work out of it.*

This is the inside view of Roebling Royal Blue—its core has been removed to show the uniformity and symmetry of the rope structure. It's not only what's outside that counts; it's what's *inside* as well. You see how concerned we are with internal security.

All the inspections and tests that Royal Blue goes through enable us to know that the rope we build will do what we sell it to do. These quality control measures help us—as they do you—to take the *long* view of Royal Blue. A brochure on long-lasting Royal Blue, its resistance to shock, abrasion, crushing and bending, is available on request. Ask your Roebling wire rope distributor or write to Roebling's Wire Rope Division, Trenton 2, New Jersey.

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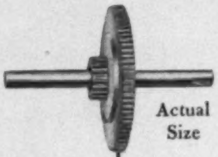
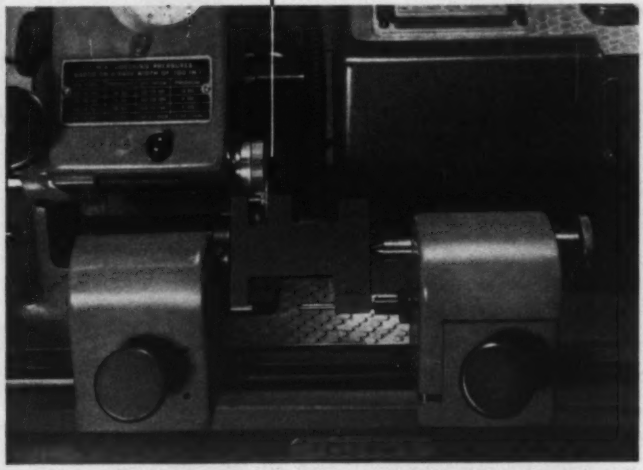
now you can check and record fine-pitch gear accuracy



at 1600 magnifications

on the No. 4 Fellows Red Liner



Now, the No. 4 Red Liner makes "composite" checks on the finest instrument gears with unbelievable accuracy and sensitivity. 1600 to 1 magnifications are obtained with the electrical recording system which gives a written, unbiased record for instant reading or for proof-of-accuracy files.

One report states — "11 teeth, 200 D. P. pinion backed up to a 100 tooth gear on a cluster, checked easily on the No. 4 Red Liner."

The job shown is 96 pitch with 22 teeth on the small gear and 80 teeth on the larger gear. The pinion shaft rides in vees in a turret-type fixture.

Fellows inspection units cover a range from the tiniest instrument gear up to some that are 24 inches in diameter.

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Gear Production Equipment

FOR HIGH REACTIVE RESILIENCY...

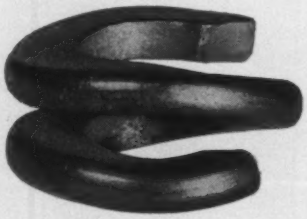
Eaton Manufacturing, Reliance Division, uses Republic A-9250 Alloy Steel

Lock washers for railroad joint applications must minimize track movement. At the same time, they must be resilient enough to eliminate the possibility of frozen joints.

Eaton Manufacturing Company, Reliance Division, is a major producer of these lock washers. They use Republic A-9250 Hot Rolled Alloy Steel. Bars are drawn into heavy gage wire, wound around a mandrel, cut off, and heat treated to exacting specifications.

High quality of alloy—according to Reliance—is essential in meeting requirements of the American Railroad Association. The same high quality, realized on a day-in, day-out basis, has minimized scrap loss.

Republic metallurgists will help you select and apply the alloy steel best suited to your needs. For information, contact your Republic representative or mail the coupon.



Track joint lock washers are produced by Eaton's Reliance Division, Massillon, Ohio, in 12 different diameters.

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Strong,
Modern,
Dependable

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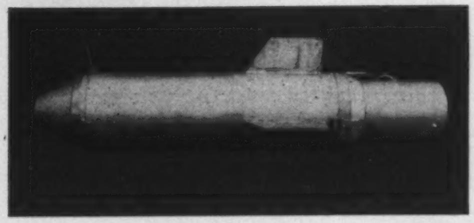

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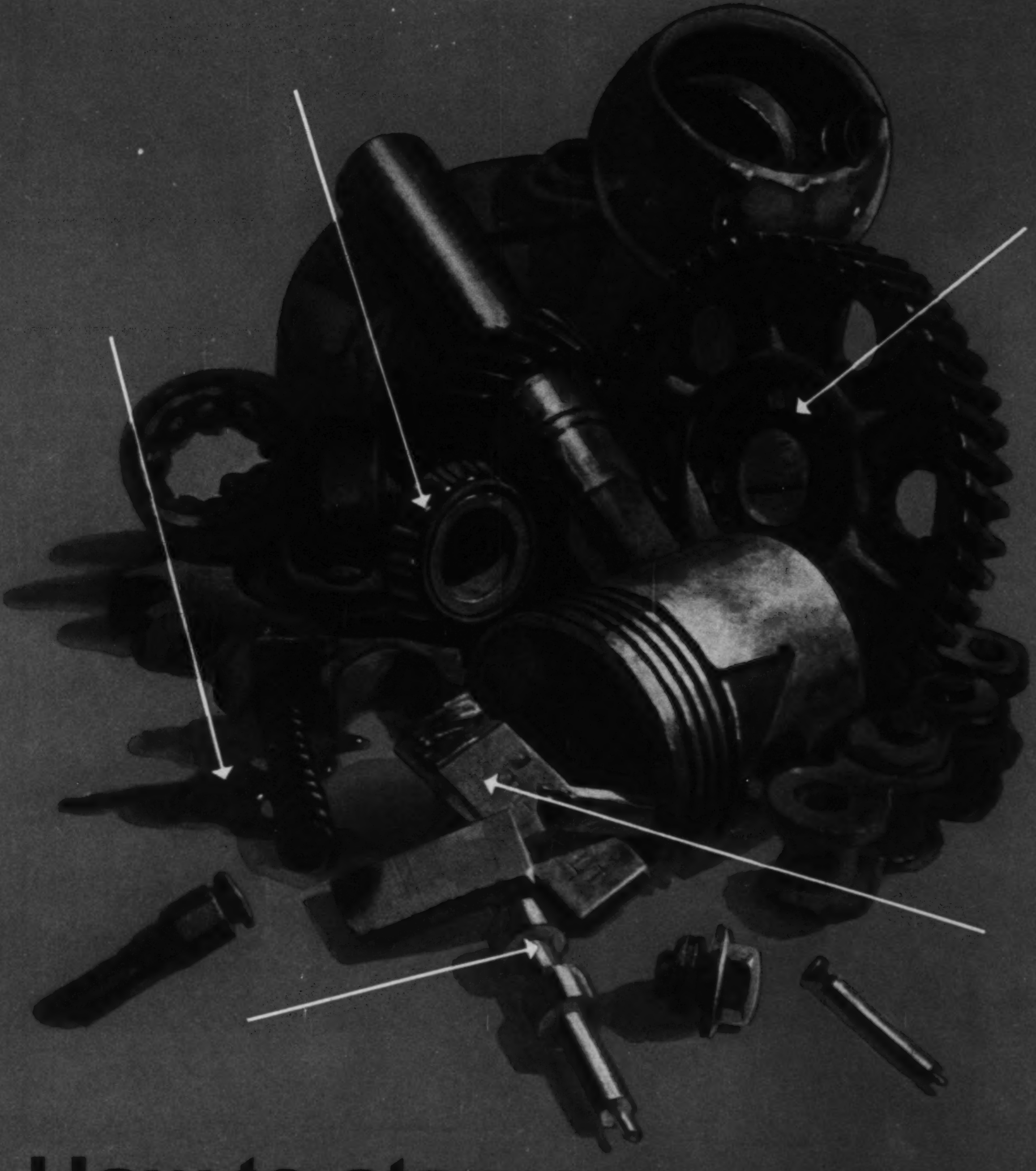


How to starve a scrap pile* at its source

* and all it represents

(DAMAGED TOOLS, RUINED MACHINES,
REJECTS, WASTED LUBRICANTS,
UNSCHEDULED DOWNTIME . . .)

TEXACO

Start a "STOP LOSS" program

Bearings ruined before their time by improper lubrication

Downtime caused by a man with the wrong grease gun

Lubricants wasted by over-lubrication

Damaged tools — burned and cratered by using the wrong type of cutting oil

Rejects from faulty cutting and grinding

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

Texaco's "Stop Loss" program has been developed for progressive managers in production, maintenance, purchasing, engineering and accounting who wish to apply new methods to control costs and add to profits.

The program has two purposes: (1) to demonstrate how organization of lubrication practices can be used to control costs resulting from product rejects, downtime, machine repair, excessive inventory, and (2) to provide specific instruction material to help plant groups find out where and how they can use Organized Lubrication to control costs in their own operations.

Lubrication is common to almost all plant functions. So don't be surprised when the "Stop Loss" program reveals ways to save in many places!

START TODAY!
cut down on your future scrap piles!
Just tear along this line

TURN PAGE FOR WHY

Expect tangible results!

HERE'S WHY AND WHERE:

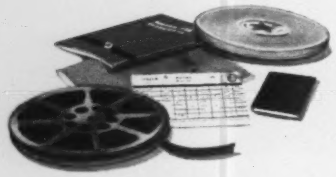
In 1959, hundreds of plants organized their lubrication practices to reduce costs.

Their managements had recognized this fact: *Lubrication is no longer just a routine operating procedure. It is a key factor in controlling costs and, as such, rightly becomes a management function.*

This doesn't mean that management must put on overalls and grab a grease gun. But when management recognizes the dollars-and-cents significance of Organized Lubrication, they have made the first step toward reduced costs throughout the plant.

The Texaco Organized Lubrication Plan studies your lubrication methods in terms of long-range savings in production, equipment life, manhour utilization and inventory. A re-evaluation in terms of Organized Lubrication usually reveals how immediate savings can be made and continued.

Texaco has developed techniques and experience to make this new concept operative. They are offered to you, with the understanding that any Organized Lubrication program depends for success on those who adopt it and apply it.



Here's the help you need to starve YOUR scrap pile

Here are the parts of the Texaco Organized Lubrication Plan available to interested plant groups:

1. "Stop Loss with Organized Lubrication," a new 25-minute color and sound film created to show the opportunities for cost control through "Organized Lubrication."

2. A film "package" for plant departments. This consists of movies on cutting oils, greases, hydraulic oils, etc., that may be selected for showing after seeing the "Stop Loss" film.

3. Coordinated booklets on the film subjects and others to be used as guides in specific areas.

4. A Texaco Lubrication Control System to take the guesswork out of your lubrication scheduling. This simple system costs almost nothing to install, yet can save up to 15 per cent of your maintenance costs.

We can promise you that a modern Texaco Organized Lubrication Program will produce a package of economies in your plant. Texaco Inc., 135 E. 42nd St., N. Y. 17, N. Y.

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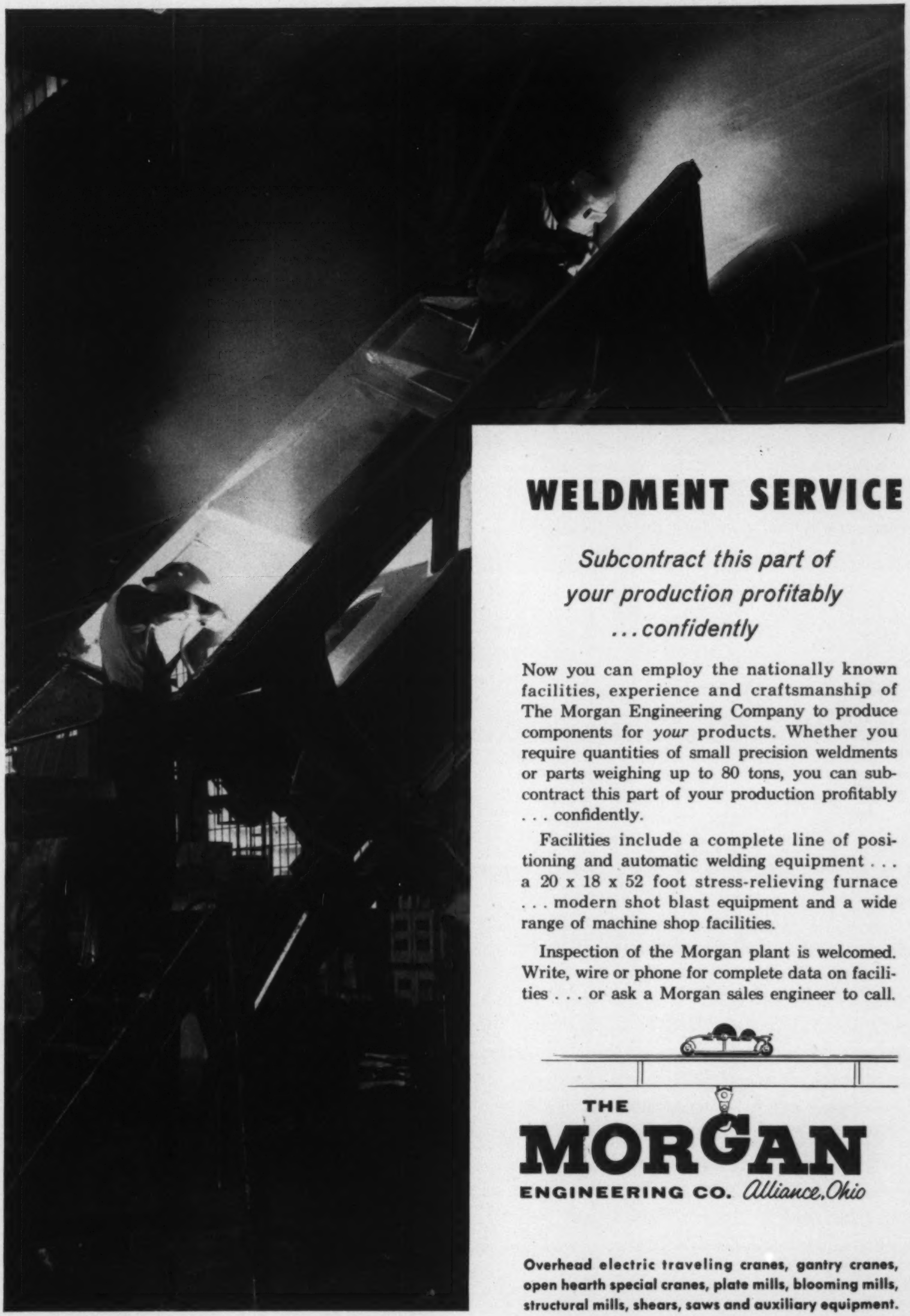

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Facilities include a complete line of positioning and automatic welding equipment . . . a 20 x 18 x 52 foot stress-relieving furnace . . . modern shot blast equipment and a wide range of machine shop facilities.

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Overhead electric traveling cranes, gantry cranes, open hearth special cranes, plate mills, blooming mills, structural mills, shears, saws and auxiliary equipment.

"Chase® metals save 50% on buffing operations," *says John Linkamper, Purchasing Agent for Coppercraft Guild Gift Wares*

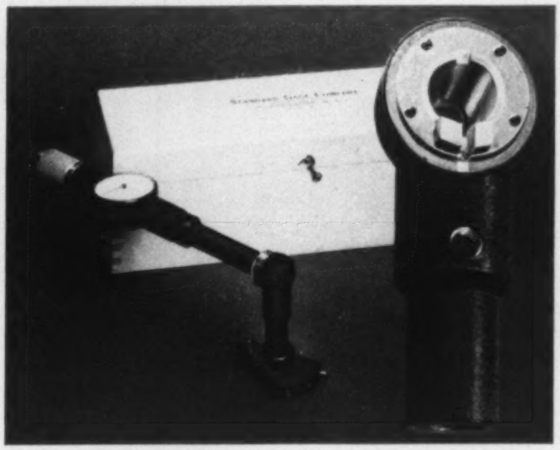
Coppercraft Guild Gift Ware is sold in the home, from samples—and has won its position of leadership through its matchless appearance. The slightest flaw in surface or finish could prevent a sale to Coppercraft Guild's discriminating customers. Mr. Linkamper reports that Coppercraft, a division of Armor Bronze and Silver Co., has had uniformly high acceptance for 65 or more items they make using Chase brass and copper.

Prior to using Chase metals, production problems were caused by critical deep-draw operations and the need for lengthy buffing and polishing. Then Chase metallurgists were presented with the problems...recommended a Chase alloy which withstood the deep draw perfectly and provided a 50% reduction in buffing and polishing. Added advantage: the stocks of metal in the nearby Chase Multi-Metals Service Center made it possible for Coppercraft Guild to order from stock, saving on storage space, metals inventory and handling.

End result of this co-operation between Chase and the manufacturer is reported to be "the exact appearance and quality we want...fewer rejects...50% reduction in buffing costs...enabling us to lower our costs."

Chase metals and Chase skills are ready to serve you in the same way.

NEW 3-MARK ROD is the free-cutting brass rod designed by Chase to meet the demands of modern high-speed machines. Cuts freely with short chips . . . is extremely straight to cut down whip. Check coupon for details on 3-Mark Rod.



THIS CHASE FORGING, for the trunnion of the gauge shown above, gives excellent dimensional accuracy. Chase forgings are die-pressed, made to close tolerances, free from pits and blowholes. Need far less finishing, too.

NEED STAINLESS OR ALUMINUM? The Chase Multi-Metals Service Center nearest you has the types and quantities you want. Call for a copy of the latest stock lists, or check and return the coupon at the right.

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☐ Stainless Steel Stock List ☐ Chase 3-Mark Rod
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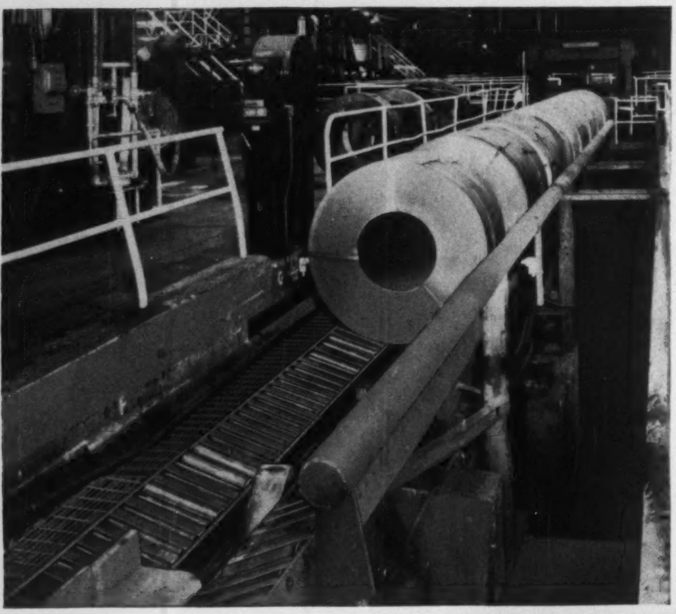
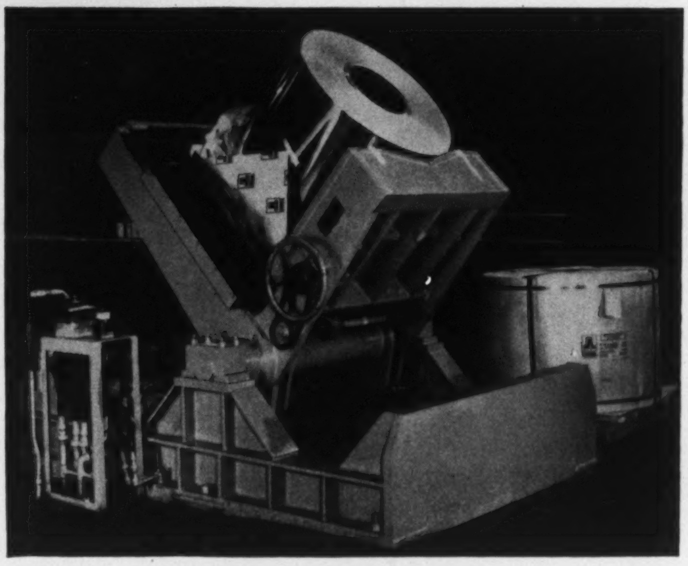


J L
STEEL

At Jones & Laughlin's modern Aliquippa Works, Mathews Pallet Conveyers and Belt Conveyers are helping to create a continuous flow of materials in their new electroweld department. Like all Mathews equipment for the steel industry, these conveyers are built to deliver outstanding performance.

- A 71-foot-long Reciprocating Beam Conveyer designed to handle 36,000-pound coils at the entry end of mill.
(Photo courtesy Aetna-Standard Division, Blaw-Knox Company.)

- Upender handling 20,000-pound tin plate coils. This unit is loaded by ram tractor and unloaded by fork tractor.



MATHEWS CONVEYER COMPANY

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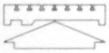
PACIFIC COAST DIV. . . . MATHEWS CONVEYER COMPANY WEST COAST, SAN CARLOS, CALIFORNIA
CANADIAN DIVISION . MATHEWS CONVEYER COMPANY, LTD., PORT HOPE, ONTARIO.

MCC
MATHEWS
Over Fifty Years of Leadership in Mechanized Handling

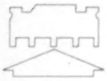
When you think of
PRECISION

For life time precision Lucas provides

airlift to saddle



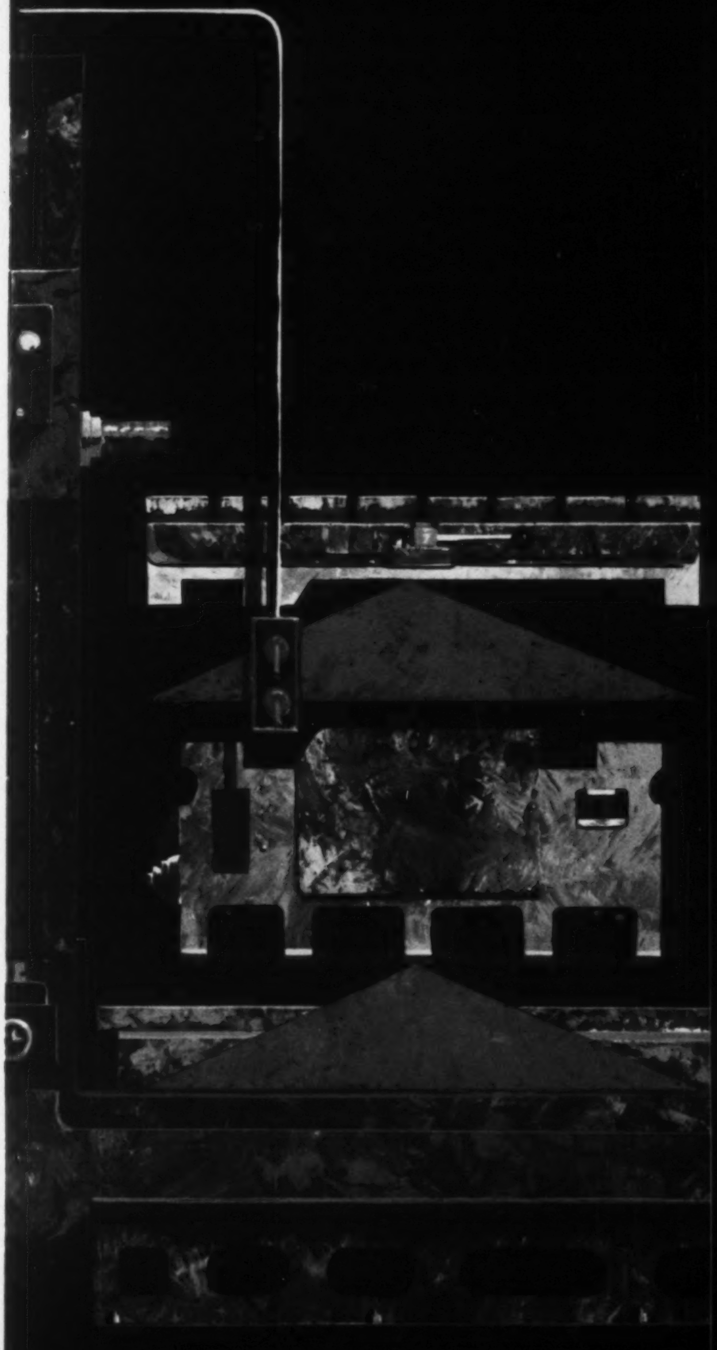
and table.



These elements are supported on a thin film of lubricated compressed air during traverse. This separation of metal from metal virtually eliminates wear. During machining cycles the saddle and table are automatically clamped down tight to provide absolute rigidity for even the heaviest cuts. Unclamping is automatic, too. These are two aspects of Lucas design which contribute to the precision of these machines. Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland, Ohio. When you think of Precision . . .

think of . . .

LUCAS
PRECISION



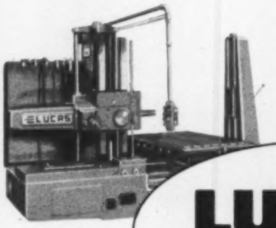
When you think of RELIABILITY

Lucas automatic power positioning
automatically repeats
automatically repeats
automatically repeats
to ±.0001 . . .

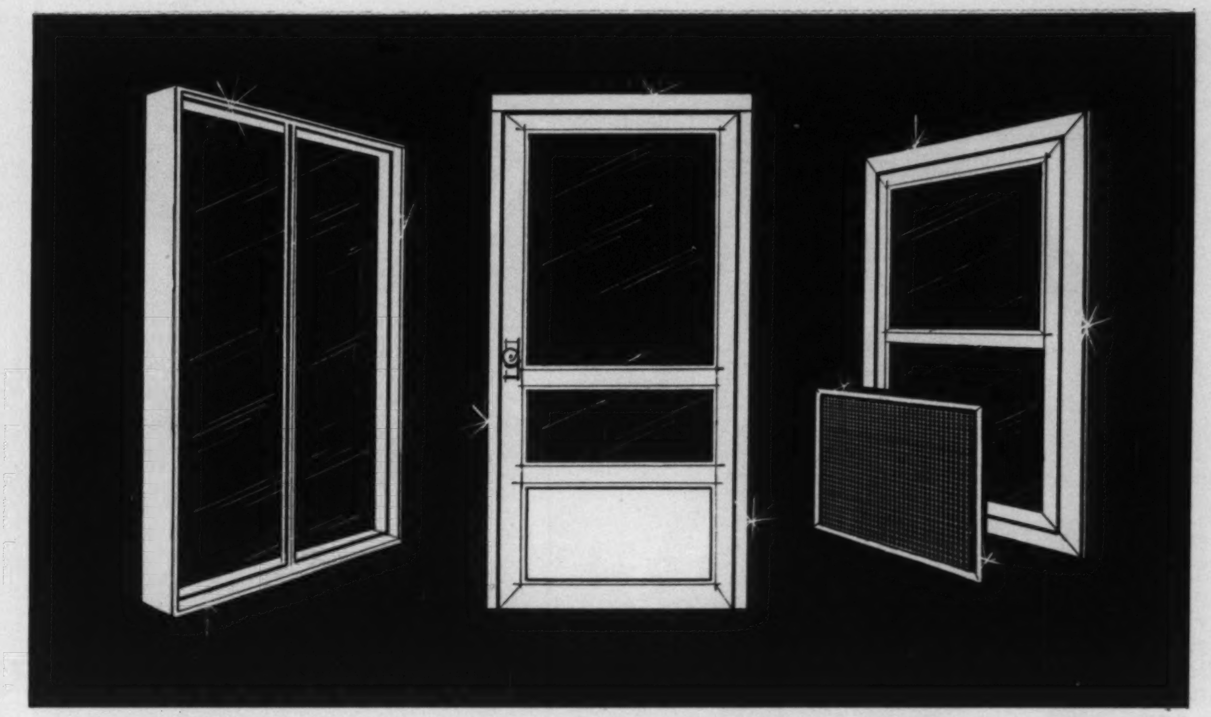
A simple, completely reliable system of dial indicators, end measures, and electrical controls automatically disengages rapid traverse, engages the fixed, constant-rate power feed and precision stops the unit at predetermined settings. Automatic power positioning assures the highest order of repetitive accuracy with an absolute minimum of operator attention.

A new catalog describes our complete line of horizontal boring, drilling and milling machines. Write Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland, Ohio. When you think of Reliability . . .

think of . . .



LUCAS
PRECISION



NOW... Colorless Protective BONDERITE Coating for Aluminum

BONDERITE 725 adds exceptional corrosion resistance to aluminum without changing the appearance of the metal!

This new Bonderite produces a *colorless,* amorphous oxide coating on aluminum without the use of electric current. In addition to imparting excellent corrosion resistance to aluminum, Bonderite 725 coatings are an excellent base for clear lacquer and paint finishes.

Colorless Bonderite 725 is particularly suited for use on aluminum building products, windows, storm and screen sash, doors, aircraft parts, automotive trim, boats, appliance parts, castings, and extrusions of all varieties.

Aluminum articles coated in Bonderite 725 and finished with clear lacquer easily meet the stringent requirements of the lime and mortar test specified for certain building products. In addition, articles finished in clear lacquer have good abrasion resistance that reduces scratches during handling and erection.

Bonderite 725 is an efficient, economical chemical treatment applied by spray or immersion application in simple processing equipment. Processing times are as low as 5 seconds.

Up-grade the quality of your products by supplying corrosion resisting Bonderized aluminum in its pleasing natural color. You can add this sales advantage to your product at a treatment cost that will please you.

For complete information now, call or write Parker, or use coupon below.

Parker
Rust Proof Company
2158 E. MILWAUKEE, DETROIT 11, MICHIGAN

BONDERITE corrosion resistant paint base • BONDERITE and BONDERLUBE aids in cold forming of metals • PARCO COMPOUND rust resistant • PARCO LUBRITE—wear resistant for friction surfaces • TROPICAL—heavy duty maintenance paints since 1883

*Bonderite, Bonderized, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

Parker Rust Proof Company
2158 E. Milwaukee, Detroit 11, Michigan

Please send Bulletin which describes Colorless Bonderite for Aluminum.

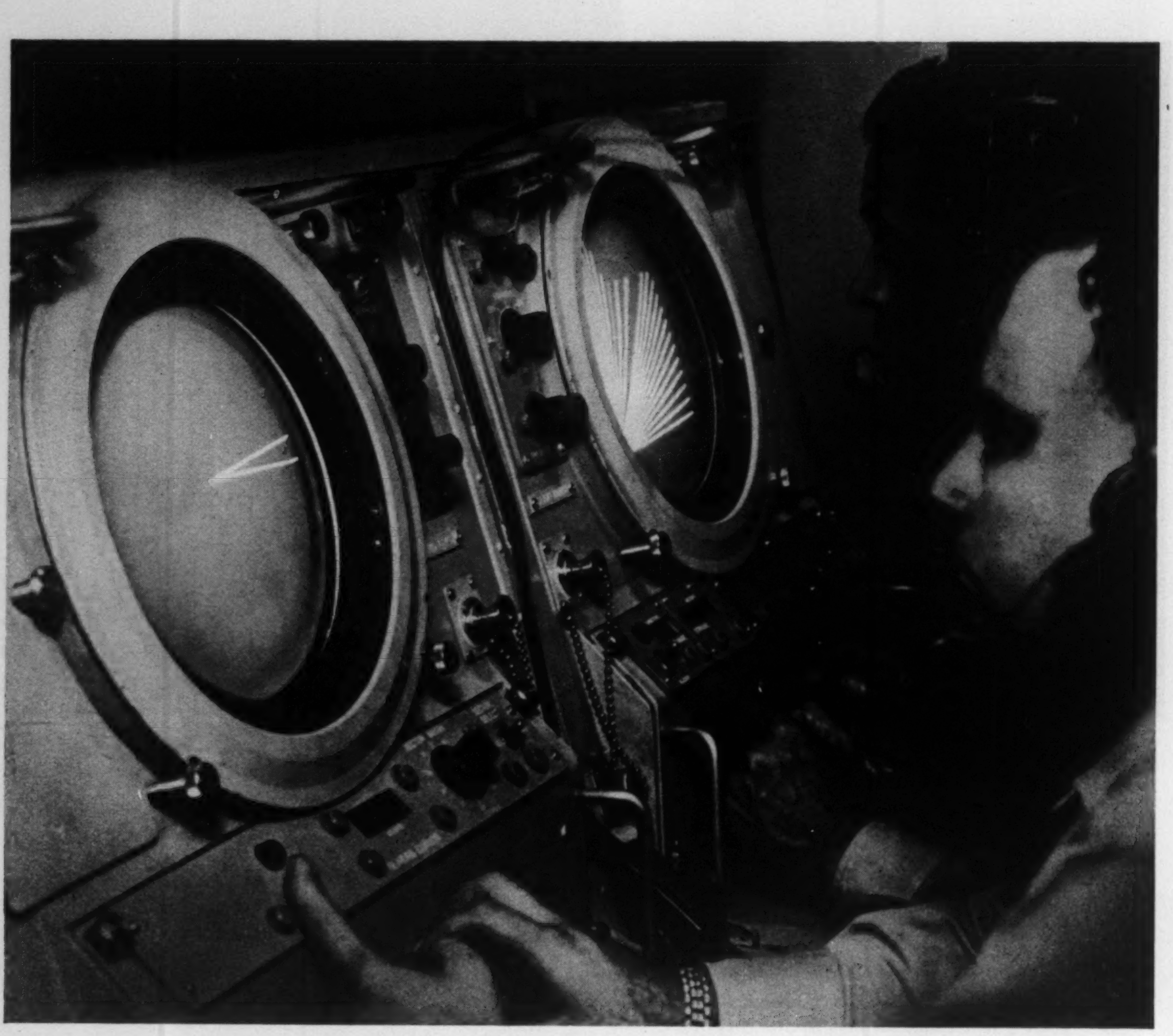
Name______________________________

Title______________________________

Company____________________________

Address_____________________________

City__________________Zone______State________



PERFECT SEALS OF METAL TO GLASS
keep this Radar System on Track

Hundreds of components in this radar system—tubes, connectors, thermal relays, transistor stems, etc. contain seals of metal to glass. These seals are made possible by special metal alloys having the same expansion coefficient as glass.

At Bishop we have been making glass-to-metal sealing alloys in tubular and composite wire form for many years. In addition, we produce stainless steel and nickel tubing in mechanical, aircraft, capillary and hypodermic grades in sizes up to 1 inch OD—plus an amazing variety of "specialties" such as clad metals, super and "exotic" alloys.

We also produce a vast line of platinum products and chemicals that have been used by industry for over a century.

We are unique because of our ability to *work these metals to such tiny, precise forms.* Bulletin No. 12 describes our tubular products—Catalog No. 5 describes our platinum products. Write for them.

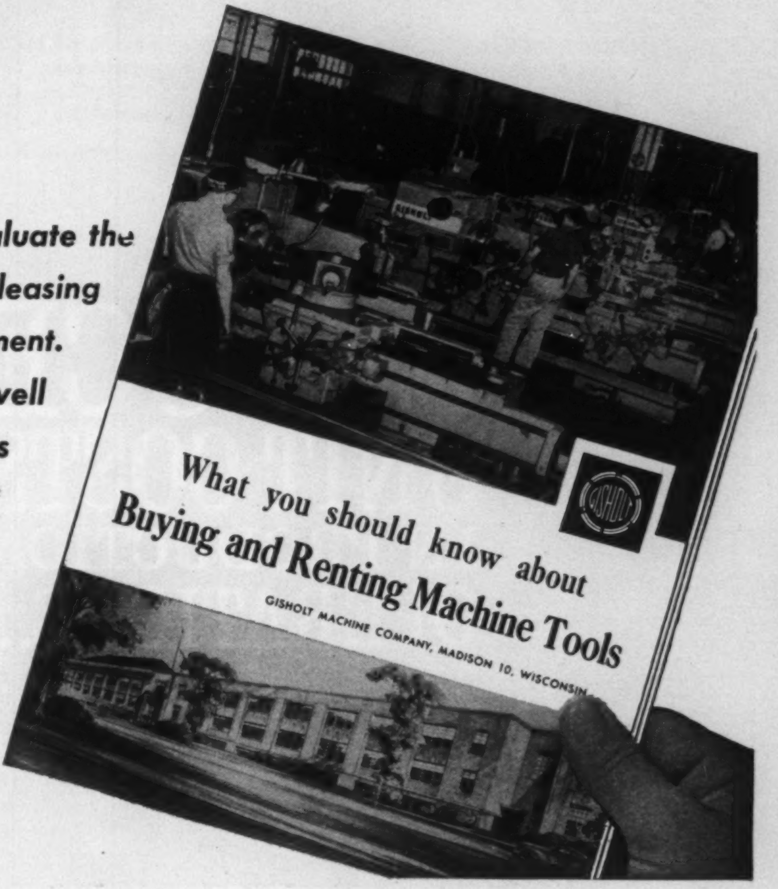
BISHOP

Tubular Products Division **J. BISHOP & CO.** *platinum works* 30 KING STREET, MALVERN, PENNA.

A JOHNSON MATTHEY ASSOCIATE "METALS FOR PRECISION AND PERFORMANCE"

Can *your* competitors turn metal at lower costs?

***Now** is the time to re-evaluate the possibilities offered by leasing of new production equipment. Your decision today can well determine your company's position in tomorrow's competitive market.*



What you should know about
Buying and Renting Machine Tools
GISHOLT
GISHOLT MACHINE COMPANY, MADISON 10, WISCONSIN

This free booklet tells how you can get new machines with minimum capital outlay

If you have delayed replacing old machines because of the relatively large capital investment, acquisition by methods other than outright purchase may solve your problems. Only a minimum initial investment provides you with the many competitive advantages that new machines offer, including greater accuracy, higher production rates and faster setup. New features and accessories simplify even the toughest jobs. Secondary operations are minimized and spoiled work becomes a thing of the past. All this means lower unit cost—more profit for you.

If you want the benefits that new machine tools can provide, and if you like the idea of letting them "pay their way" while they "turn" a profit for you, you'll want to write for Gisholt Bulletin 1173 on buying and renting machine tools. It fully explains one of the most liberal and comprehensive policies in the industry, and covers several types of leasing and time payment plans with vital information on depreciation, tax angles, the MAPI formula and other timely questions. The coupon will bring your free copy. Send it along today.

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin

ASK YOUR GISHOLT REPRESENTATIVE ABOUT FACTORY-REBUILT MACHINES WITH NEW-MACHINE GUARANTEE

Gisholt Machine Company
1217 E. Washington Ave.
Madison 10, Wisconsin

Without obligation, please send your Bulletin 1173.

Name................................*Title*........................
Company..
Street address...
City..............................*Zone*........*State*..................

REDUCE
UNIT COSTS
IN PRODUCTION
OPERATIONS...

New Mobilmet

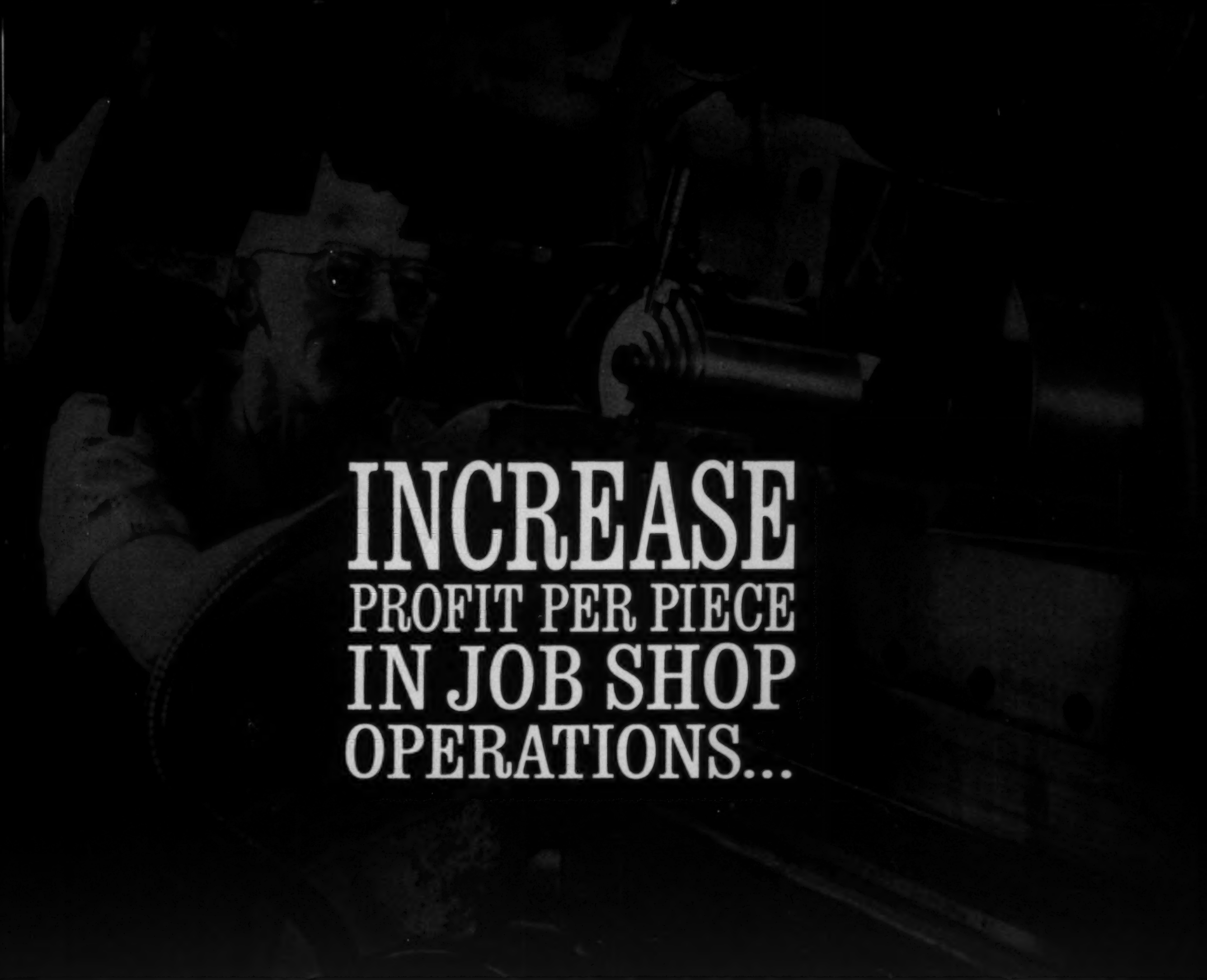
Whether yours is a production or job-shop operation, you can benefit from new Mobilmet oils because they assure superior tool life, excellent finishes and reduced staining in the machining of an unusually wide range of metals.

- **In production operations** this means reduced unit costs. And by using fewer cutting oils, you save through quantity purchases and handling.
- **In job-shop operations** this means greater profits per piece. And, you reduce machine downtime for draining, changing, or blending cutting oils.

Mobil

The reason for the unique versatility of Mobilmet oils is a new additive combination, developed and patented by Mobil, which is pressure-temperature selective in its activity—highly effective over the wide ranges of cutting pressures and temperatures produced in machining various metals with greatly different physical characteristics. As a result, a single Mobilmet oil is useful for both tough, draggy metals and hard, brittle metals.

Check the benefits new Mobilmet oils offer you. For complete information mail the coupon at right. Mobil Oil Company, 150 East 42nd Street, New York 17, New York.



Oils *multi-metal cutting fluids with unique pressure-temperature selective additive composition*

MOBILMET OILS OFFER YOU!

1 *Greater machine output*
  - A. More pieces per hour through increased feeds or speeds
  - B. Reduced time-out for tool changes

2 *Lower tool costs*
  - A. Fewer tool grinds
  - B. Less metal removed per tool grind

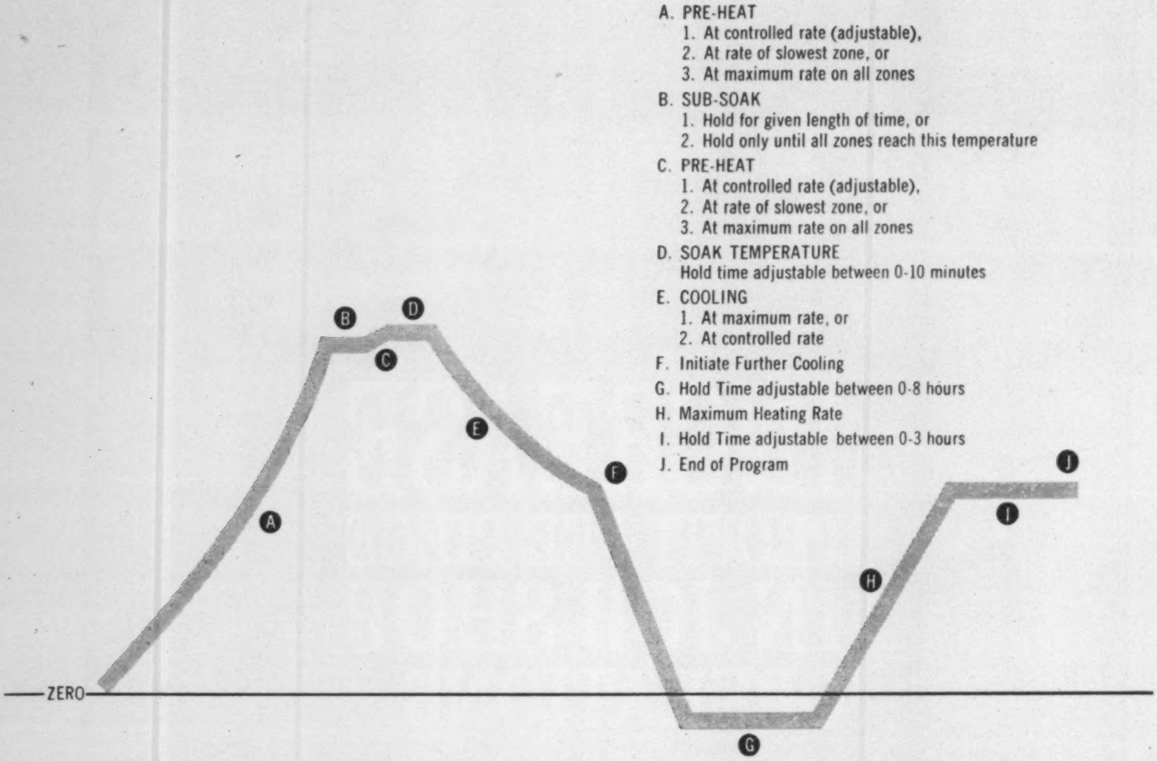
3 *Reduced loss from rejects*
  - A. Dimensional tolerances maintained
  - B. Surface finish improved . . . with possible elimination of additional finishing operation

4 *Simplification of cutting oil requirements*

Mobil Oil Company, Room 2058-B
A Division of Socony Mobil Oil Company, Inc.
150 East 42nd Street, New York 17, N. Y.

Gentlemen: I am interested in learning how new Mobilmet oils can help in my metalworking operation. Please provide further information.

*Name*____________________
*Position*____________________
*Company*____________________
*Address*____________________
*City*__________ *Zone*____ *State*______
*(Check one): Job Shop*____ *Production*____ *Combination*____



A. PRE-HEAT
  1. At controlled rate (adjustable),
  2. At rate of slowest zone, or
  3. At maximum rate on all zones
B. SUB-SOAK
  1. Hold for given length of time, or
  2. Hold only until all zones reach this temperature
C. PRE-HEAT
  1. At controlled rate (adjustable),
  2. At rate of slowest zone, or
  3. At maximum rate on all zones
D. SOAK TEMPERATURE
  Hold time adjustable between 0-10 minutes
E. COOLING
  1. At maximum rate, or
  2. At controlled rate
F. Initiate Further Cooling
G. Hold Time adjustable between 0-8 hours
H. Maximum Heating Rate
I. Hold Time adjustable between 0-3 hours
J. End of Program

When temperature uniformity is a must... reproduce your heat-treating cycles with L&N's new master-slave program control

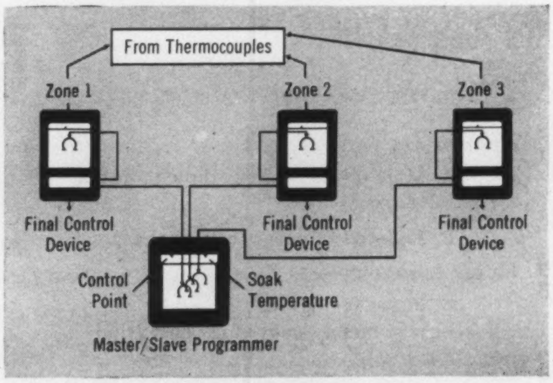
Designed for applications where temperature uniformity is of prime importance, L&N's new master-slave program control system has the flexibility to take your product—with minimum temperature gradient—through various heating and cooling cycles. It is currently being used in brazing stainless steel honeycomb panels for supersonic aircraft and missiles.

You can use this system on either batch or continuous furnaces . . . can control from either work or furnace temperatures. Heating cycles may be at a fixed rate, or at the rate determined by the slowest or fastest heating zone. As many as twenty-four zones may be automatically controlled by one master-slave programmer.

This master-slave system is available with 3-action P.A.T. control for fuel-fired furnaces; with 3-action C.A.T. control for continuous, stepless regulation of input to electric heaters or blankets; or with D.A.T. control for either electric or fuel-fired furnaces.

The system includes Speedomax® H controllers with appropriate couples and control devices for each zone; and a master-slave programmer for automatically and continuously adjusting control-point for each zone.

If your process can benefit from precisely controlled heating and cooling, you may be surprised to learn how large a return you can get by modernizing with this quality instrumentation. For details, call your nearest L&N office, or write us at 4957 Stenton Ave., Phila. 44, Pa. Ask for Process Data Sheet 660(2).



LEEDS NORTHRUP
Instruments Automatic Controls • Furnaces
Pioneers in Precision

ANOTHER NORTON PRODUCT

The Reason for Resin

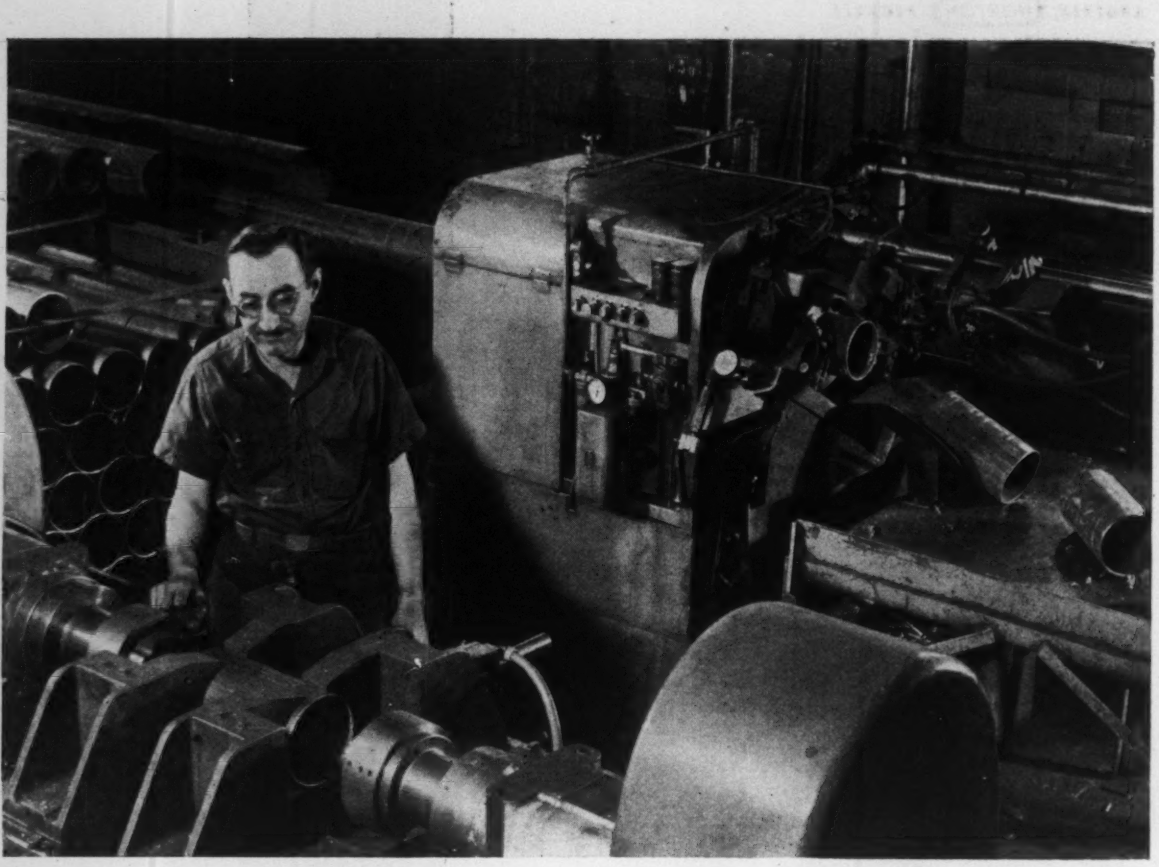
(resin-bonded belts)

Simply this: Behr-Manning *resin*-bonded* belts (and discs) out-last and out-produce glue-bonded ones for roughing and finishing. Why? Because loading and breakdown are minimized. You get more cutting for your belt dollar.
Prove it. Ask for an in-plant demonstration. Write Dept. S-12, BEHR-MANNING CO., Troy, N. Y., a division of Norton Company.

***RESINALL® . . .** *an all-resin-bonded aggressive belt of strong X-weight cloth, for maximum heat resistance in most all rough and intermediate grinding operations.*

***RESINIZED® . . .** *a resin-over-glue belt of good heat resistance, in strong X-weight for flat polishing, and in flexible J-weight for contour polishing.*

BEAR BRAND Abrasives



Tubing for this job must meet the most rigid specs

This manufacturer of heavy-duty idler rollers has turned to increased automation and tighter material specs to improve production. Note automatic feed and cutoff of tubing in background . . . the quick setup for double-end counterboring at the next station.

Tubing for this job must meet highest standards for uniformity of size, straightness and close tolerance of concentricity. But where do you find large O.D. tubing to meet these rigid specs? At Ryerson, of course—home of the industry's tightest quality controls.

Here you choose from the nation's largest stocks. And you're assured of consistent quality that is so important to meet the demands of automation. The more automated your production line, the less chance for visual inspection, and the more dependent you are on the consistent quality of the raw material.

So when you next need tubing or help with selection and application problems, be "Metalogical"—call Ryerson.

The type of tubing you need is here

Carbon Steel Tubing—seamless and welded, round and square, cold drawn and hot finished.

Alloy Steel Tubing—seamless rounds.

Fluid Power Tubing—Rockrite cylinder finish, seamless and welded; hydraulic fluid line; seamless and welded cylinder tubing.

Structural Tubing—square, rectangular and round.

Ledloy® 170 Tubing—fast machining, 170 sfm.

Stainless Pipe and Tubing—cold drawn seamless and welded. Also welded ornamental.

Aluminum Pipe and Tubing—all commonly used alloys and tempers.

PVC Pipe and Tubing—time-tested Ryertex®- Omicron PVC.

METALOGICS
RYERSON PLUS VALUES

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

RYERSON STEEL

Joseph T. Ryerson & Son, Inc., Member of the INLAND® Steel Family

PLANT SERVICE CENTERS: BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT • HOUSTON • INDIANAPOLIS LOS ANGELES • MILWAUKEE • NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS • SAN FRANCISCO • SEATTLE • SPOKANE • WALLINGFORD

STEEL
The Metalworking Weekly

Metalworking Week®

December 12, 1960

Nance Says Sixties Still Can Be Golden

"The forecasters of the booming 1960s may not yet be wrong," says James J. Nance, former auto and appliance executive and now president of Central National Bank of Cleveland. "The basic growth factors of a year ago are still with us. The forecasters erred in timing. The work content of our economy is changing, and we must change with it. The production expansion of our industries must be matched by research and improvement of our distribution systems, methods, and costs."

Sales Drop for Most Industries

The National Electrical Manufacturers Association reports October, 1960, sales of refrigerators dropped 26 per cent below the year-earlier mark; sales of ranges fell 11 per cent; sales of dishwashers dropped 18 per cent . . . Gas Appliance Manufacturers Association says October sales of ranges fell 8 per cent below the September mark; sales of water heaters fell 14 per cent . . . The Industrial Fasteners Institute reports its index of shipments (1956-58 = 100) fell to 83 in October from 97 in September . . . Shipments of magnesium mill products in October dropped 21 per cent below the September mark . . . October orders for resistance welding equipment rose 27 per cent above the September mark, reports Resistance Welder Manufacturers Association.

Thompson's Wooldridge Sees Big Future for 'Intellectronics'

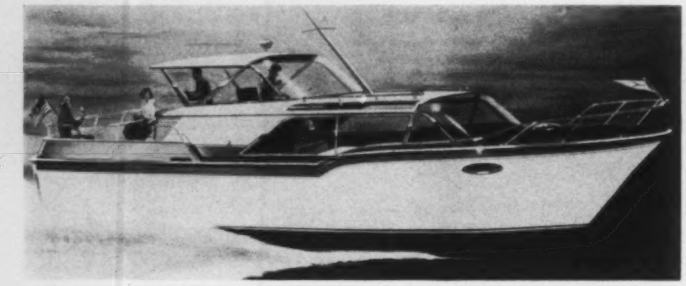
D. E. Wooldridge, president, Thompson Ramo Wooldridge Inc., predicts a big future for "intellectronics"—the extension of man's capabilities by the use of electronic devices. He predicts greater increases in human productivity via computers than "through anything else that has happened in the last 300 years." He says computers will eventually be used in the home for such tasks as the supervision of cooking . . . and in schools for teaching.

Unemployment: Big Problem for New Administration

Among the pressing problems that will face the incoming Kennedy administration is unemployment. The Bureau of Unemployment Security last week reported that unemployment has increased in 60 per cent of the nation's 150 major industrial centers. Labor Department officials indicate that official unemployment totals for November will probably exceed 4 million—highest figure for the month in two decades. They add that the total may exceed

5 million by January. Joblessness is classified as "substantial" (unemployment is 6 per cent or more of the local labor force) in 51 areas now—vs. 32 a year ago and 24 in November, 1957, when the last major recession was forming.

Kaiser Unveils Boats of the Future



This 35 ft express cruiser, the Elegance, is among new marine styling concepts being presented to the nation's boating industry by Kaiser Aluminum & Chemical Corp. This craft has a stretch formed hull, polished teak decks, and cabin quarter panels of white vinyl over lightweight aluminum sheets.

Zinc Shipments Rise

Slab zinc shipments in November inched up to 68,980 tons for the best mark since August, says American Zinc Institute. Shipments for 1960's first 11 months total 766,966 tons—down 4 per cent from the year-earlier period. Producers' stocks dropped for the fourth straight month, mostly reflecting strikes.

Faster Growth Is Answer to Foreign Competition

A retreat to protectionism by U. S. industry "would place U. S. export markets in jeopardy and in the long run imperil . . . the U. S. balance of payments. The abandonment of trade liberalization would risk permanent forfeiture of U. S. leadership in trade matters." So states the U. S.-Japan Trade Council in a new report. It says the attainment of a higher economic growth rate is "the only effective remedy for most of the present misdirected demand for relief from import competition."

Big Columbium Forging Produced

Wyman-Gordon Co. has produced what it calls the "largest known" closed die forging of columbium. Wah Chang Corp. supplied the 1300 lb ingot (it contains 1 per cent zirconium), which was produced by electron beam melting followed by duplex, vacuum arcmelting to remove impurities. The forging is for a highly classified defense project.

Here's List of Fastest Growing States

The final count by the Census Bureau shows that the U. S. population increased by 28 million during the ten years ended Apr. 1, 1960. Here are the 21 states that grew most, percentagewise:

Florida	78.7%	Colorado	32.4%	Michigan	22.8%
Nevada	78.2%	Maryland	32.3%	Ohio	22.1%
Alaska	75.8%	Utah	29.3%	Louisiana	21.4%
Arizona	73.7%	Hawaii	26.6%	Washington	19.9%
California	48.5%	Connecticut	26.3%	Virginia	19.5%
Delaware	40.3%	New Jersey	25.5%	Indiana	18.5%
New Mexico	39.6%	Texas	24.2%	Oregon	16.3%

U. S. Will Rely More on Canadian Raw Materials

By 1980, the U. S. and Canada will need twice the volume of industrial raw materials they now consume, concludes the National Planning Association. It projects an average annual rise in gross national product (GNP) of 4.1 per cent for the U. S., 4.9 per cent for Canada. It says the U. S. will "rely to a much greater extent upon Canadian sources" for industrial raw materials. Largest increases will be in iron ore, natural gas, nickel, and asbestos, but gains will also come in cobalt, copper, lead, zinc, sulfur, and other items. Canada will become more dependent on the U. S. for coal, molybdenum, and phosphate. The report predicts that U. S. GNP will hit $1,050 billion (in 1954 dollars) by 1980. It estimates the 1980 index of industrial production (1947-49 = 100) at 401.

49 Million Newly Independent Africans: A Market?

The 14 African nations that gained their independence this year have a total population of 49 million, says the Population Reference Bureau, Washington. At least three more African nations will achieve freedom in the next eight months. And two more are actively seeking independence. The 19 nations have a total population of 103 million. The United Nations estimates total population of the 50 nations in Africa at 236 million. Industry is in a primitive state of development in most of those countries. Tremendous problems of economic development lie ahead. But a long term market is abuilding for world traders.

Coming: A Paste-Up World?

Houses without nails, airplanes without rivets, and clothes without stitches are three trends seen by Alan A. Marra, University of Michigan adhesives expert. He says adhesives are "rapidly becoming the preferred means of assembling many constructions because of great strength and rigidity and because new adhesives perform adequately in high speed factory operations."

Auto Output Schedules Reflect Optimism

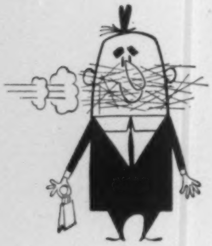
The U. S. auto industry will build 562,400 cars this month if manufacturers meet their present schedule, says *Ward's Automotive Reports.* November output totaled 597,132 units. If the schedule is met, the industry will have its second best final quarter on record. Further reflecting autodom's optimism, January-March production schedules are being programed at 1,724,600 units—only about 50,000 units below the goal for this year's final quarter. It means the auto industry is looking for near-record sales during 1961's first three months. Sales last month rose an estimated 529,300 cars, well ahead of the year-ago pace. Inventories are close to 1 million.

Ford Move Emphasizes International Trend

Ford Motor Co.'s plan to spend $350 million in buying the outstanding stock of its British subsidiary, Ford Motor Ltd., emphasizes the tremendous financial pull exerted on the New World by the Old. The Commerce Department estimates that U. S. manufacturers will spend $1.3 billion on plant and equipment overseas this year—$100 million more than was poured out last year. About 44 per cent of the dollars will be invested in Western Europe. Commerce anticipates a further climb in foreign investment next year. It appears to be a simple case of capital seeking its most productive use. In Europe, a growth market for durable goods is coupled with stable currencies, sensible tax laws (rapid amortization, for example), and lower production costs.

Purchasing Agents Are Uneasy

Purchasing agents are being extremely cautious in their buying policies, the latest survey by National Association of Purchasing Agents reveals. The PAs are making only the minimum commitments required to have material on hand for scheduled jobs. (84 per cent say they are buying production materials on a 60-day-or-less basis.) Reporting on their business in November, 19 per cent of the PAs said new orders rose above the October level, while 28 per cent reported declines.



Straws in the Wind

U. S. exports in October totaled $1.76 billion—up 9 per cent from September's . . . the Export-Import Bank of Washington has loaned $1.8 million to a Buenos Aires seamless pipe manufacturer to purchase U. S. capital equipment . . . U. S. military departments have agreed to forecast requirements for 13 categories of electronic components on a five year basis; first forecast is due in July . . . Corco Corp., a producer of cleaning equipment and chemicals, is giving S&H Green stamps to its industrial customers.

Metalworking Pulse

The Business Trend: For the second time since 1953, STEEL's industrial production index failed to regain the ground lost during the Thanksgiving week. The other time: 1957. **Autos:** Production schedules have been firmed by the excellent November new car sales rate. If December's schedule is to be realized, weekly output will have to at least stay level. **Steel:** The ingot rate slipped to the lowest level for any nonstrike, nonholiday period since the week ended May 11, 1958.

- **INDUSTRIAL PRODUCTION**

Week ended Dec. 3	**149†**
Year ago	**167**

Details on Page 65

- **PASSENGER CAR PRODUCTION**

Week ended Dec. 10	**137,000***
Year ago	**86,056**

Details on Page 62

- **INGOT PRODUCTION RATE**

Week ended Dec. 11	**48.3%†**
Week ago	**48.9%**

Details on Page 116

†Preliminary. *Estimated.

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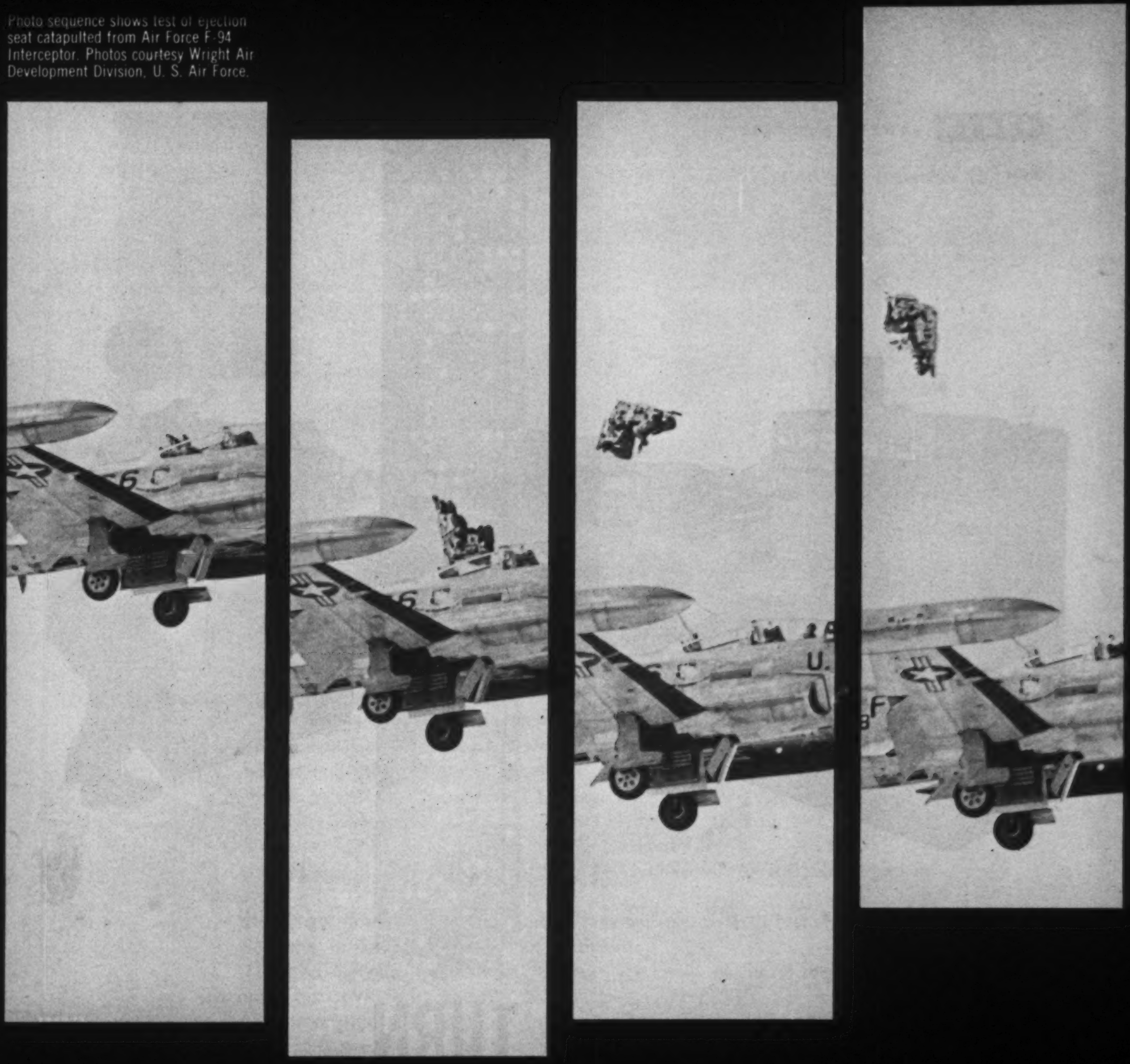
Photo sequence shows test of ejection seat catapulted from Air Force F-94 Interceptor. Photos courtesy Wright Air Development Division, U. S. Air Force.



"...the pilot's safe!"

You can replace an airplane. But you can't replace a man's life. So you devise a pilot ejection seat that catapults your man out of danger. Arnolt Corporation of Warsaw, Indiana, makes the M3A1 catapult mechanism for several different U. S. Air Force ejection seats that can leave a crippled plane at a 17-g force. And TAILORED TUBING from Michigan Seamless Tube Company helps propel the seat, survival kit, parachute, and pilot, up and out of danger. Arnolt specified Michigan Seamless Mechanical Tubing because it could be TAILORED to the job. This is Chrome-Moly tubing, MIL-T-6736A, absolutely free of all defects. Wall concentricity, straightness, I.D. tolerances, tensile strength, all held to rigid specifications. If you need tubing for a tough job, contact Michigan Seamless Tube Company, 402 West Street, South Lyon, Michigan.

Steel

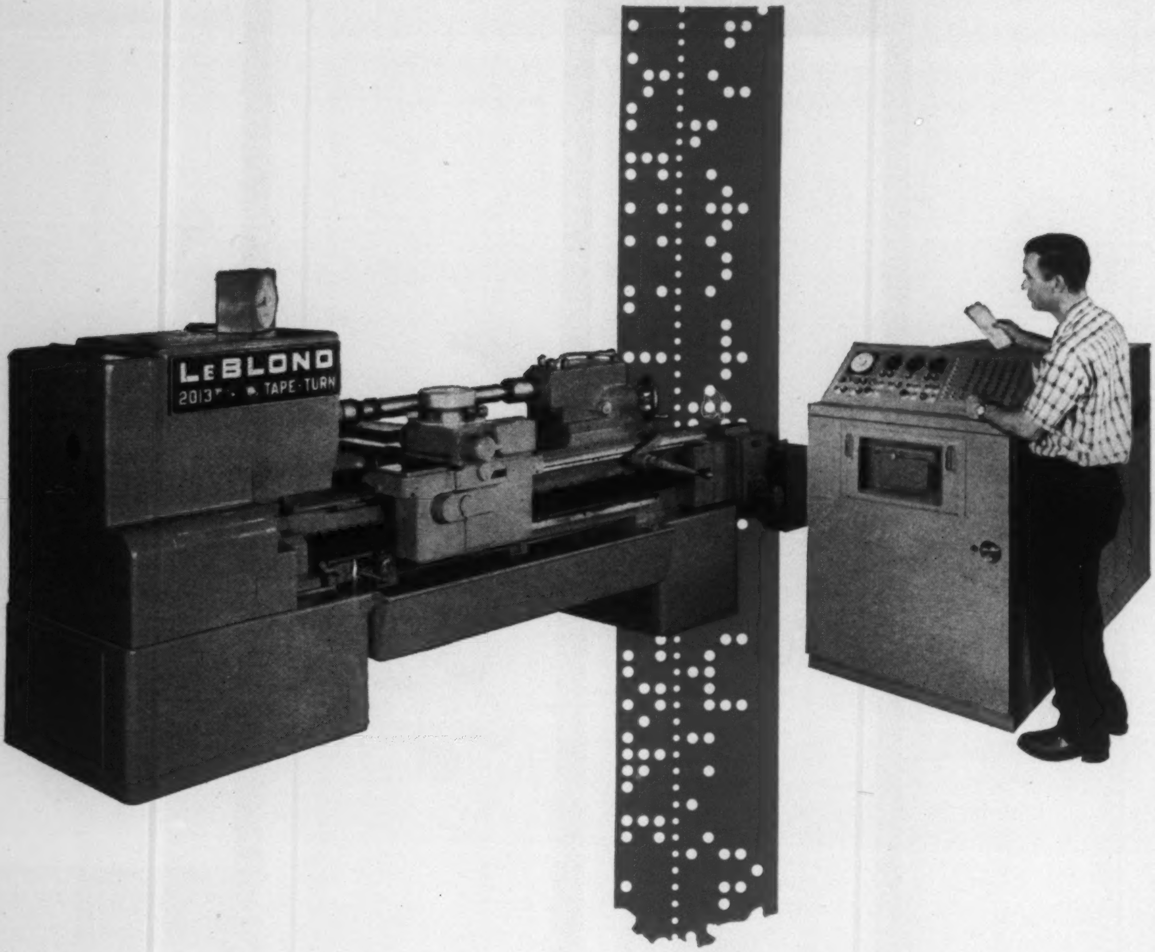
TT

TAILORED TUBING
by
Michigan Seamless Tube Company
Gulf States Tube Corporation

MECHANICAL, AIRCRAFT, PLAIN AND FINNED HEAT EXCHANGER TUBING

MICHIGAN SEAMLESS TUBE COMPANY/GULF STATES TUBE CORPORATION

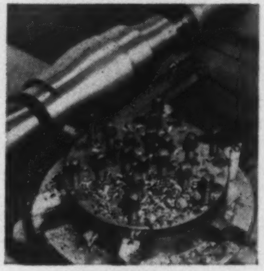
SOUTH LYON, MICHIGAN
ROSENBERG, TEXAS



TURN WITH TAPE

Do it with TAPE TURN, the lathe that turns contours by numerical control; and tapers, sharp angles, radii, facing cuts and plunge cuts besides, not to mention heavy duty straight turning. No need for handwheels and levers. This lathe takes orders remotely from standard 1″ 8-channel punched tape or a convenient pushbutton keyboard.

Tape-Turn puts engineering specifications at the cutting edge. Production Control can maintain control. Command by General Electric's new Mark Century numerical control. Full zero offset. Manual overrides at the console.



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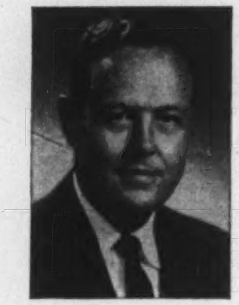


THE EDITOR'S VIEWS **STEEL**

December 12, 1960

Recession in Expectations!

At this time last year, there was much talk about the U. S. being on the threshold of a new era of growing population and expanding markets described as the Soaring Sixties.

The gross national product (GNP), the forecasters said, would reach $510 billion in 1960, about $20 billion above the 1959 level.

Capital spending would increase about $7.5 billion to $38 billion.

Steel ingot production would increase about 36.5 million tons to 130 million.

Of course, none of those predictions is being realized.

But as one executive so aptly puts it, the only real recession we have had is in our expectations. We expected too much.

In reality, 1960 is turning out to be one of the best years in history.

The 1960 GNP of $503 billion will be a record.

Capital spending of slightly less than $36 billion will be the second best in history.

Steel ingot production of 99.3 million tons will be the sixth best.

Statistics, of course, tell only part of the story.

The steel industry, for example, has been the victim of one of the most rapid inventory turnarounds in history.

Consumer inventories dropped from a prestrike total of 25 million tons on June 30, 1959, to about 12 million tons on Jan. 1, 1960. (See Page 107.)

In the first quarter of 1960, consumers scrambled to replenish inventories, with the result that the steel industry operated at 93.8 per cent, and supplies were back to almost 20 million tons by Apr. 30.

Since that time, consumers have been living in part off inventories. By Dec. 31, they will be down to 10.5 million tons. (See Page 107.)

Had it not been for inventory liquidation, steel ingot production in 1960 would have been 12 million tons higher.

Thus steel operations at 50 per cent and less in recent weeks have distorted the true picture of metalworking activity.

Such distortions, of course, make it difficult to appraise the business outlook and to plan constructively.

But despite the uncertainties, we think there is no better time to get set for the larger volume that inevitably lies ahead.

The recession in expectations is over!

Irwin H. Such

EDITOR-IN-CHIEF

Hand coiling of small spring orders is a skilled operation at The Yost Superior Co. in Springfield, Ohio. The company uses Johnson Music Spring Wire exclusively. Here, worker coils .012 wire into a compression spring with 16 coils having an O.D. of .196 inch. Small orders are filled overnight in this department.

Johnson Wire Speeds Overnight Delivery Of Handmade Springs

A spring maker who built a flourishing business by filling small orders practically overnight uses Johnson Steel & Wire Company's Music Spring Wire exclusively.

President L. V. Barnes of The Yost Superior Company, Springfield, Ohio, says flatly:

"Johnson Music Spring Wire is best." Since 1924, when a merger of Superior Spring Co. and Yost Gearless Motor Co. formed The Yost Superior Co., the firm has concentrated on producing custom-made springs and wire forms.

In one day recently, five telephoned orders for small lots of springs all specified the quickest possible delivery. "Three of those orders went out the same day and the other two were shipped the next morning," said William H. Craig, secretary-treasurer who heads production and purchasing activities.

Three factors are all-important to Yost Superior. They are:

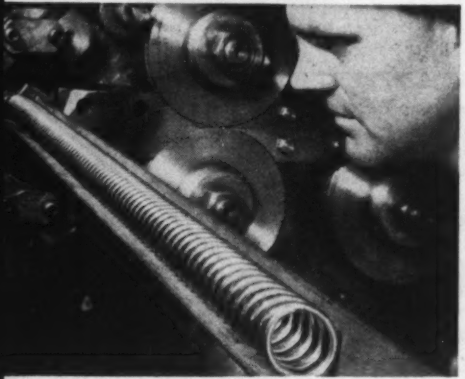
● **Spring Making Skill** — Yost Superior's bonus incentive plan, the long tenure of its employes and its steady growth for more than a half-century all demonstrate the company has a skilled work force which knows and practices the art of spring making.

● **Sizable Inventory**—Large wire stocks, usually running around 500 tons, are always on hand in Yost Superior's stock room. Mr. Craig said: "Our customers depend on us to supply their needs quickly. That means large stocks of wire sizes commonly used." He added:

"Johnson Music Spring Wire is so good—consistently—that we feel confident in laying in a large supply. We don't worry about quality varying from coil to coil or shipment to shipment. We can depend on wire we buy today to match the properties and performance of wire we bought a year ago.

"When we order from Johnson,

Electronic gager on this Torrington W10A Coiler measures to .005 inch in determining whether each spring coiled is the proper length. Springs rejected by the gager are blown to the side while good springs fall into container. Spring being coiled is made of .010 inch Johnson Music Spring Wire. It has an O.D. of .121 to .126 inch and is 5/16 inch long. It takes 1,000 springs to weigh a quarter pound.



Coiling a long spring on a Torrington W12A coiler from Johnson .120-inch diameter Music Spring Wire. The 95 coils in this spring measure 30-1/2 inches in length. Each coil has an O.D. of 1-1/16 inches.

we get quick delivery from warehouses in Akron or Chicago."

• Good Raw Materials — President Barnes said: "We demand the utmost in uniformity of diameters, finishes, tempers and physical properties. We get it from Johnson Steel & Wire Co.

"We don't have to ask for service. It's given us without asking. And Johnson Music Spring Wire has worked well for us. I would say their wire is the best. One hundred percent testing of finished springs proves it.

"We're accustomed to holding the diameter of springs — and often spring lengths — to tolerances stated in thousandth's, so we've got to have good wire. Johnson Music Spring Wire helps us meet specs and its performance helps us meet load requirements."

While Yost Superior makes springs in large production runs for everything from grass seed spreaders to missiles and rockets, its Hand Department is a key operation.

In the Hand Department where orders for less than 100 springs or wire forms are filled, Johnson Music Spring Wire proves itself.

Coiling springs by hand means high labor costs so it's important to keep them down to a minimum or the cost of making a few springs would go sky high. Here cost of the wire is insignificant but quality of the wire is most important.

• Quality Comes Through— That's because there's little or no time for experimenting or trial runs The Hand Department pays off because the spring maker knows his business and uses Johnson Steel Wire with its predictable performance qualities.

Yost Superior uses the full range of Johnson Music Spring Wire from 008 inch diameter up to 250 inch to make all kinds of compression, extension and torsion springs as well as a bewildering array of wire forms

That's a good recommendation for any spring maker. Whatever your needs for Music Spring Wire or any other fine wire specialty, you can count on Johnson Steel & Wire Co. to give you the same consistent quality and good service which pleases Yost Superior.

You can get better wire and better products, starting today. Just call the nearest district sales office, listed here, and talk to a Johnson man who knows wire and production problems.

Grinding of spring ends on a Besly Grinder. These compression springs, made of .047 inch O.D. Johnson Music Spring Wire, are only 9/16 inch long and have an O.D. of 13/32 inch. On this machine, the closed ends are being ground square.

Coils of Johnson Music Spring Wire are delivered to the Coiling Department from Yost Superior's large stock room. The company normally carries an inventory of about 500 tons of wire.

Johnson Steel & Wire Company, Inc.

Worcester 1, Massachusetts

***a subsidiary of* Pittsburgh Steel Company**

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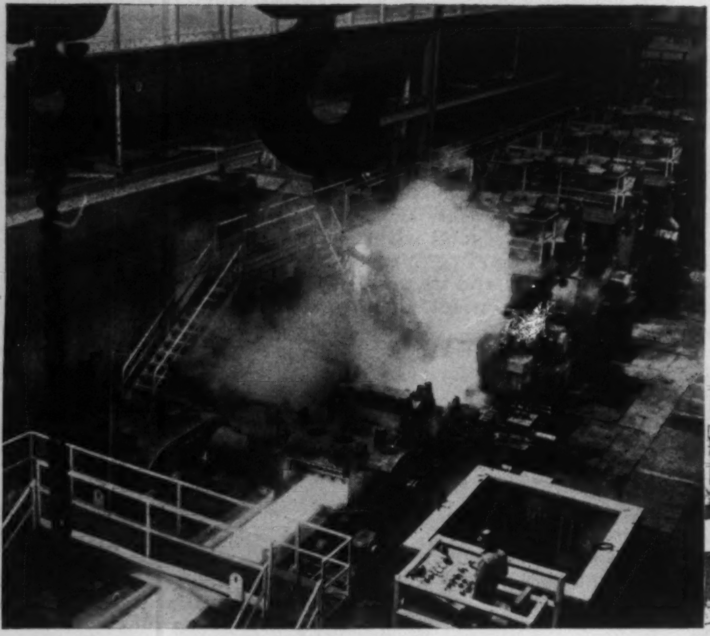

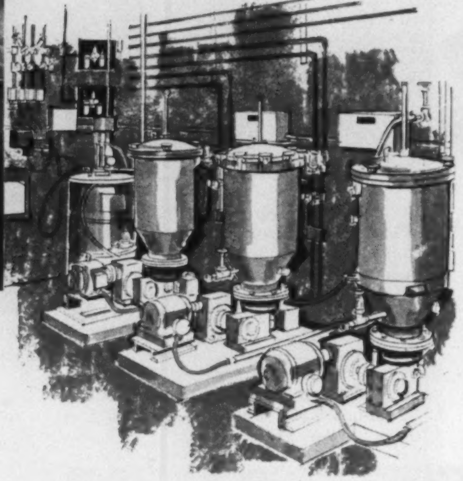

• Typical large, automatic motor-driven pumping station set-up for heavy-duty service on a hot strip mill centralized lubrication system.

Positive Farval centralized lubrication protects 1597 bearings on Jones & Laughlin's hot strip mill

On this semi-automatic, punch card controlled, high-production (*rolls over 100,000 tons monthly*) 44-inch Hot Strip Mill—first of its type in the world—26 Farval centralized lubricating systems work 'round-the-clock to protect 1597 vital bearings—help keep this up-to-the-minute rolling facility in continuous 24-hour production, cut operating costs.

Rolling mill operators the world over have found through experience that Farval:

- Saves time—lubricates all bearings in a few minutes, while mill equipment remains in full operation.
- Saves power—by reducing friction, Farval cuts power consumption by as much as 20%.
- Saves bearings—bearing life increases 5 to 25 times when Farval serves the equipment.
- Saves lubricant—much as 3 out of every 4 pounds.

Farval can be relied upon to provide the right amount of lubrication—when it's needed, where it's needed. In addition Farval provides indication and adjustment at every bearing, system time cycle flexibility, and handles the widest range of lubricants. Many bearings can easily be lubricated over a large area from one conveniently located central station.

Remember, for the ultimate in bearing protection on all types of industrial production machines and equipment—Farval is the cost-cutting answer. Get the latest information on how Farval can fit into your production picture—it's in free Bulletin 26-T. Write us for your personal copy, today.

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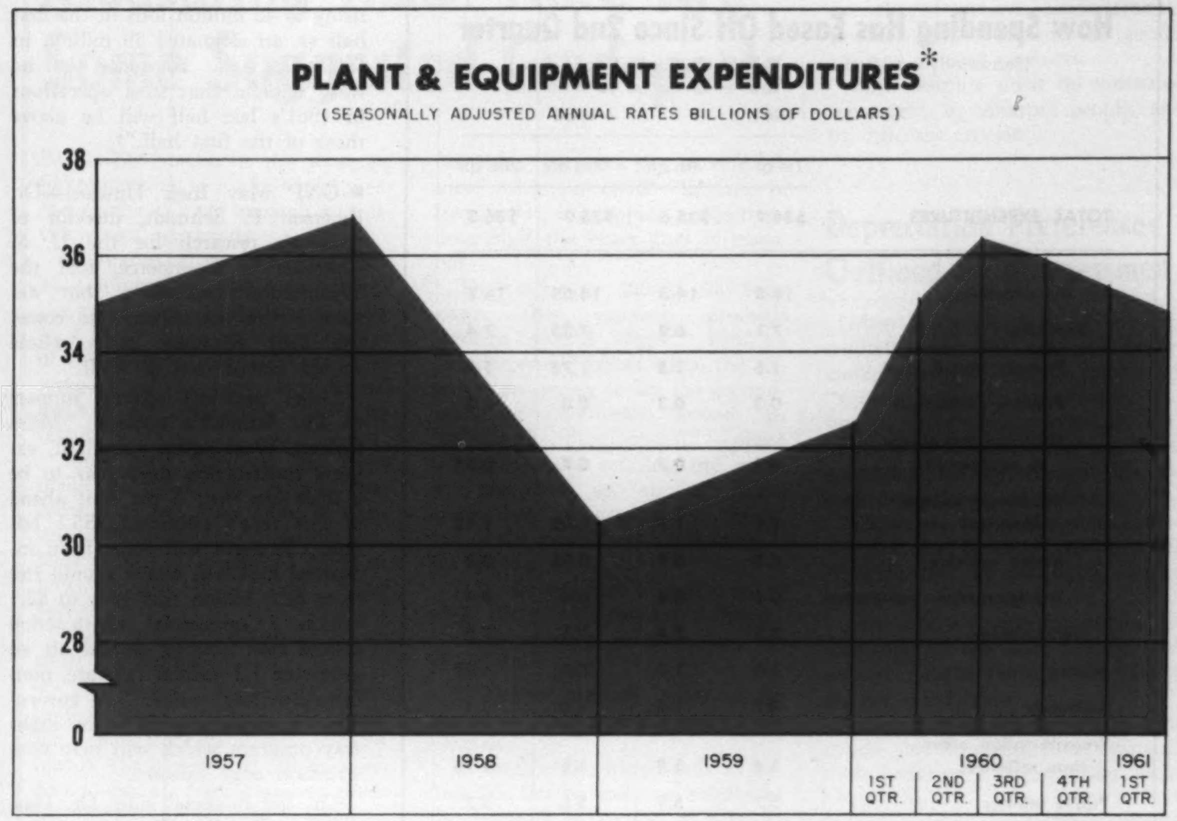


PLANT & EQUIPMENT EXPENDITURES*

(SEASONALLY ADJUSTED ANNUAL RATES BILLIONS OF DOLLARS)

*4th qtr., 1960, 1st qtr., 1961, are estimated.
Source: Commerce Department.

Capital Spending Slide Continues

INDUSTRY'S spending plans for plant and equipment in the first quarter of next year are about $700 million below expected outlays in the current quarter.

But the projected figure ($34.9 billion, seasonally adjusted annual rate) still represents high level spending. It is less than 1 per cent below outlays in 1960's first quarter.

This year, capital spending will hit an estimated $35.74 billion, despite a downtrend that started in the second quarter. Comparisons: The total is $3.2 billion above 1959's and is second only to 1957's record $36.96 billion.

- **Projections**—The chart on the next page shows what's happening in the major industry groups. Projected spending of the durable goods industry for the next quarter is up slightly from this quarter's, to an annual rate of $7.1 billion. Biggest cutbacks are indicated by the railroads and other transportation industries.

Spending by public utilities and nondurable manufacturers is expected to be close to the levels of the last six months.

- **Key Question**—How long will the decline continue? Respondents to STEEL's semiannual survey of nearly 7500 metalworkers indicated that the planned increase in metalworking capacity in 1961 will be slightly below this year's—3.5 per cent vs. 4.5 per cent. (See STEEL, Nov. 21, p. 55.)

Many managers are weighing next year's spending plans against the profit squeeze and a possible business upturn by mid-1961. There's still considerable emphasis on new equipment to get costs down, and many managers are reluctant to curtail expansion programs. General Electric Co.'s chairman, Ralph J. Cordiner, said his firm plans to step up capital spending in 1961 despite a possible sales decline in the early months.

Many observers feel that manager thinking on those factors could determine whether $35 billion will be spent for plant and equipment next year.

How Spending Has Eased Off Since 2nd Quarter

(Seasonally adjusted annual rates—billions of dollars)

	1961	1960		
	1st qtr*	4th qtr*	3rd qtr	2nd qtr
TOTAL EXPENDITURES	**$34.9**	**$35.6**	**$35.9**	**$36.3**
All Manufacturing	14.3	14.3	14.65	14.7
Durables	7.1	6.9	7.35	7.4
Primary iron & steel	1.5	1.5	1.75	1.6
Primary nonferrous	0.3	0.3	0.3	0.3
Electrical machinery & equipment	0.6	0.7	0.7	0.65
Machinery except electrical	1.1	1.1	1.05	1.15
Motor vehicles	0.8	0.9	0.95	0.9
Transportation equipment	0.5	0.4	0.4	0.4
Nondurables	7.2	7.4	7.3	7.3
Mining	1.0	1.0	1.0	1.05
Railroads	0.7	1.0	1.0	1.1
Transportation other than railroads	1.6	1.8	1.9	2.15
Public utilities	5.7	5.9	5.6	5.7
Commercial & other	11.7	11.7	11.75	11.6

Source: Commerce Department.
*Estimates.

1961 Ingot Production Should Match This Year's

STEEL INGOT production in 1961 will be between 95 million and 100 million tons, just about matching this year's expected output, predicted Irwin Such, STEEL's editor-in-chief, at the U. S. Chamber of Commerce's annual business outlook conference in Washington.

This year, the steel industry was victim of one of the most rapid inventory turnabouts in history. At the beginning of the year, steel consumers had inventories amounting to 12.2 million tons. In the first quarter, they scrambled for steel, and stocks shot up to 19.8 million tons. They've been living partially off inventories ever since.

Result: Steel stocks by the end of this year should be down to an estimated 10.5 million tons. There may be more liquidation in the first quarter, but it's felt that inventories of many consumers are nearing irreducible minimums.

(A slightly less optimistic forecast was made by Joseph L. Block, Inland Steel Co.'s chairman, at a Chicago conference on the business outlook. He sees steel production rising to 42 million tons in the first half vs. an estimated 39 million in 1960's last half. He added that he was "hopeful that steel operations in 1961's last half will be above those of the first half.")

- **GNP May Inch Upward**—Dr. Emerson P. Schmidt, director of economic research for the U. S. Chamber of Commerce, told the Washington conference that despite further adjustments to come, the 1961 economy as a whole should exceed that of 1960.

Other panelists offered support to Dr. Schmidt's outlook. Miles Colean, Washington consulant, expects construction next year to be a little less than 5 per cent ahead of this year's estimated $55.1 billion. Strength will come from industrial building, which should rise from $2.9 billion this year to $3.1 billion. Commercial construction should rise; housing should hit an estimated 1.3 million (private, nonfarm dwelling) units. The government is giving a push to the highway program which will help construction edge upward.

On the financial side, Dr. Harold L. Cheadle, deputy manager and director of economics and research of the American Bankers Association, gave this outlook:

The U. S. balance of payments problem and the impending change of administration tend to cloud the outlook. However, levels of outstanding debt (government, real estate, business, and consumer) can be expected to rise next year. Funds will be available to finance high level business activity. Interest rates in the near term won't rise significantly, may even soften.

Wages of Hourly Workers In Steel Average $3.83

The American Iron & Steel Institute reports total employment in the steel industry averaged 587,363 during the first ten months this year. Payroll: $3,354,334,607.

It's estimated that hourly workers received an average of $3.83 per hour (including fringes) during the period. They worked an average of 36.1 hours per week.

Measuring R&D: Here Are Some Suggested Guideposts

BUSINESS managers are shopping for procedures to evaluate the creative efforts of their research and development operations.

Unable to rely on precedent, they have improvised and even ignored attempts at evaluation in the past. In a study made several years ago of 200 leading companies, only 46 were found to have any formal method for evaluating their research.

Since then, progress has been made in developing certain concepts, says the Association of Consulting Management Engineers Inc., New York, in a report, "Evaluation of R&D—A Riddle Being Solved."

Three general methods of assessment are suggested:

- Quantitative: Principally a formula method, research gets credit for a set percentage of the increased income from each of three categories—process improvements, product improvements, new products—according to fixed standards.
- Qualitative: Basically subjective —even intuitive. Assessment primarily depends on management's impression of R&D's contribution and its efficiency. In practice, more depends on the general impression of the usefulness of the research program and management's judgment of the top R&D man.
- Integrated approach: This combines the quantitative and qualitative techniques. The method measures the technical efficiency of the R&D program as audited by an outside expert and the degree of integration into the company's objectives and procedures as evaluated by top management.

Here are a few guiding principles suggested by the New York association for measuring research.

1. To establish benchmarks, a manager must break down the entire R&D program into segments for individual examination.

The first move is to determine the project's purpose: Is it to find a new product, cut costs on a manufacturing process, add some gadget for sales purposes, or accomplish some other objective? Because of frequently overlapping objectives, describing the exact goal is essential.

The manager should be fully aware that research proceeds through several stages: First, a "fundamental" phase when the scientists are trying to lay the groundwork for discoveries; second, an "advanced development" phase when they are refining the product; and third, an "applied" phase when they are getting the "bugs" out of the product and preparing it for market.

It is obvious that a project in its early phase will measure differently than when it reaches the "applied" level.

2. Define precisely what is expected of R&D and the rest of the company.

No evaluation which fails to define this can be valid or helpful to the manager. The job of R&D is to provide the information which is needed to cut costs, find and eliminate production bugs, or improve an existing item. The job of the company is to translate that knowledge into profits.

The R&D manager, in evaluating his output, should be satisfied that the facts are accurate, relate to the purpose of the project, and are efficiently produced.

Fundamentally, such evaluation has been primarily qualitative. More objectivity can be injected if the manager compares his performance with that of his competitors, becomes thoroughly familiar with the department's operations, works out a good recording and rating system, and develops consistent yardsticks.

3. Distinguish between direct output and indirect results.

Assessing the knowledge (direct output) obtained and the methods used to get it does not go far enough for the needs of a business organization. Of equal interest are the indirect result (economic benefits) accrued.

Examples of the indirect results of research are cost savings achieved because of process improvements, product improvements, or profits realized on new products.

Both outputs must be measured separately, by different people, and by different criteria.

Depreciation Preferences Outlined by Businessmen

Most businessmen would give up capital gains treatment of depreciable property sales in return for "a more adequate depreciation system." Investment decisions that increase capital spending would be spurred if the government liberalized depreciation allowances.

Those are the findings of a survey by the Research Institute of America Inc. of its 30,000 members.

Five of every nine companies responding to the RIA survey said present depreciation allowances are not satisfactory.

Eight of every 13 firms said they would be encouraged to expand their facilities if depreciation were liberalized.

Among the depreciation methods preferred:

First choice: Freedom to use their own judgment as to equipment lives and methods on a consistent basis. Second choice: A depreciation adjustment to reflect increased price levels. Third choice: Grouping of assets into broad-class categories with generally shorter minimum lives prescribed by statute.

New Type Generator Tested

An experimental electric generator, using the magnetohydrodynamics (MHD) principle, is being tested by Avco Corp. at its Everett, Mass., research laboratory. The unit is said to have much greater potential power output than Avco's previous model.

In the MHD process, hot ionized gas is channeled through a powerful magnetic field to produce electricity. The simple system, which has no moving parts, promises to boost efficiency 25 per cent over existing power generators, says Avco.

How Ford Motor Co. Played Pied Piper in Berea, Ohio

HERE is a story of how a giant industrial plant and a city co-operated to solve their mutual problems.

Ford Motor Co.'s Cleveland foundry, Brookpark, Ohio, was looking for a place to dispose of waste sand. Berea, a neighboring community, had the place. Abandoned quarries near the downtown area had made it a city of holes. (In the 1800s, it was the grindstone capital of the world.)

- **Action**—A hole 40 ft deep by 300 ft in diameter only one block south of the center of town was the first project. Through the years, it had degenerated into an unsightly, foul smelling city dump populated by hundreds of cat sized rats.

The Pied Piper used music to exterminate Hamelin's rats. Ford used 50,000 truckloads (650,000 cu yd) of spent, foundry sand at Berea. The job took several years.

"Ford was the Pied Piper," says Joseph Skodis, Berea's safety-service director. "Even the rats are gone. At first, we were fearful that the displaced rodents would move into the downtown area. Instead, they have disappeared mysteriously."

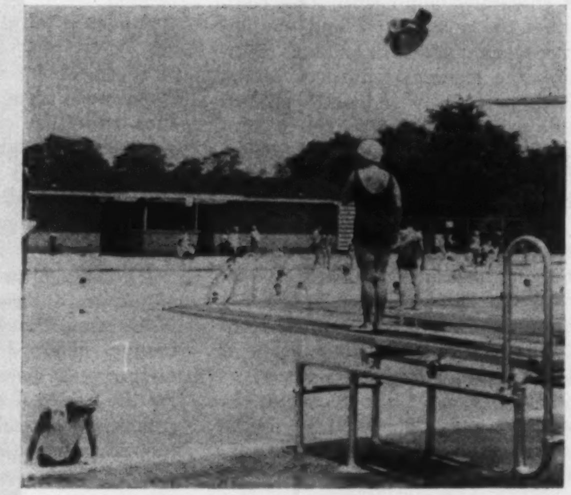
The foundry uses large quantities of sand to make molds and cores for engine blocks and other auto parts. Most of it is used only once, and it is also sanitary.

- **New Land**—The former eyesore is now the site of a new police station, public library, municipal swimming pool, youth center cabin, and a 350 car parking lot. Among the beneficiaries of the facilities are a number of Ford employees who live in Berea, a company official points out.

- **More Projects**—Six months ago, the foundry started to fill a second quarry, also near the center of town. The area will eventually become a 380 car parking lot for a new shopping center.

A third hole, also near the city's hub, will be filled next. This project (the final one) will restore a substantial piece of public property behind a row of new apartment dwellings and will permit the city to add a new street to its downtown area.

Ford can also be credited with an assist in baseball. The company sent 200 truckloads of slag to nearby Puritas Springs Park to build two ball diamonds for the Puritas Springs Boys Club.



How Good a Neighbor Are You?

BEING a good neighbor as an individual or as a corporate citizen takes some doing: You can't just tell people how good you are; you have to show them.

Experience has proved to Ford Motor Co. that you can't be a good corporate citizen by remote control. By entrusting the main responsibility for its good neighbor policy to people who live and work in company cities, Ford has fashioned a community relations program that is tailored to the needs of each community.

• Ford Survey — Early in 1949, Ford's Community Relations Dept. did a series of studies in plant cities. It found:

1. Charitable contributions based on national standards don't always meet local requirements.
2. Local management lacked community relations authority or was uncertain about what action to take.
3. Because Ford is a decentralized company (often with several divisions operating in the same city), both the community and local management were uncertain as to who could speak or act for the company.

• Effective Solution—Ford did two things:

1. Developed policies and procedures for the guidance of field management.
2. Established a top management committee in each plant city with responsibility to maintain and improve the company's relations with the community.

Ford's Community Relations Dept. in Dearborn (headquarters) co-ordinates efforts of 51 committees. The department (J. Philip Martin is manager) maintains direct communication with committees.

The department, in turn, issues planning guides and special instructions to committees and puts out a community relations newsletter which reports committee activities. A community relations manual is provided all committee members. Field public relations managers provide on-the-spot guidance.

"A successful community relations program needs the co-operative effort of the entire company and cannot be accomplished by public relations people, no matter how skilled they may be," says Mr. Martin. "A successful program cannot be erected on professional public relations gimmicks. It is not something that is practiced; it is something that is. It is the expression of a company's true corporate character. It is reflected in all its policies and operations and, particularly, in the attitudes and conduct of all its management.

"The proper approach is not in a program of communication or education of the public but in the acquisition of a less cocksure and self-righteous attitude which may allow the public to educate us."

• The Corporate Citizen—Being a good corporate citizen means:

- Conforming to the law as well as accepted codes of business ethics.
- Maintenance of the appearance, health, or comfort of the community.
- Effort to reduce smoke, noise, stream pollution, or any other nuisance.
- An attitude that is cordial, approachable, and hospitable.
- Giving fair share financial support to civic, charitable, and educational programs.
- Contributing a reasonable amount of personal service and leadership to programs designed to improve the community.

Gone is the day when citizens regarded a local company first as a producer of goods or services, then as an employer—and perhaps as a taxpayer. Beyond that, what a company did was apparently regarded as its own business. Industry was almost expected to be a cold hearted, or at least an indifferent, member of the community.

• New Deal—Mr. Martin points out that with the advent of the social reforms of the 1930s—strong labor unions, social and economic legislation, and a sudden surge of social agencies—industry was given a compelling demonstration that to whatever degree it neglected its social and civil obligations, someone else, primarily the government, would pick them up.

"Since that time," Mr. Martin observes, "most large companies have recognized that the only proper defense against legislation which would unduly limit its corporate freedoms and ultimately destroy its corporate effectiveness was to develop an increased responsiveness to public opinion."

• Scope of Activity — Community

Check Your Neighborliness

Do you make it a practice to . . .

- **Show the citizens of every plant community that your company is a good citizen and a good employer?**
- **Demonstrate that your local plant is not merely a branch of a large corporation but is a local business which fully accepts and willingly acts upon its local obligations and interests?**
- **Maintain harmonious relationships with community leaders, based on a spirit of mutual respect and interest?**
- **Keep the local community fully informed of what the company is doing and trying to do and why?**
- **Create an employee climate conducive to the attraction of the most desirable people of the community as new employees?**
- **Aid the community in maintaining itself as a desirable place in which to live and work, and as a partner in your growth, with full recognition of its obligations to its industrial citizen?**

*Based on Westinghouse Electric Corp. community relations objectives.

relations can be anything from cutting weeds around a plant to the co-operative effort of rebuilding a city.

"Look for ways to help; don't let the community come to you," says Robert McCoy, manager-employee and public relations, Calumet & Hecla Inc.'s Wolverine Tube Div., Detroit. You get and deserve far more credit that way, he believes. But Mr. McCoy doesn't feel that it's necessary, or even wise in some cases, to be particular about getting credit for good deeds.

"Community leaders know who's helping," he adds, "and they'll let the community know. Don't tell them how good you are. Show them."

Wolverine supports worthy activities in its southwest area of Detroit, a Hungarian community. It helped with Hungarian refugees during the recent revolt.

The company hunts for little ways to be of help. It contributes a float for local parades, offers tubing for flagpoles, helps with promotional arrangements for local shindigs. Mr. McCoy says that such small assists are being done all the time—and they add up.

• A City Rebuilt—Take the regeneration of East Chicago, Ill.: Inland Steel Co. and Youngstown Sheet & Tube Co. contributed money, land, and manpower through the Purdue-Calumet Development Foundation, the agency directing the work.

Inland and its subsidiaries have contributed millions for a hospital wing, park, and lakefront overpass in East Chicago.

Joseph T. Ryerson & Son Inc., an Inland subsidiary, has joined with other industries and community groups in helping to renovate the Greater Lawndale area on Chicago's southwest side.

• How It Pays Off—A basic reason for good community relations is spelled out by Westinghouse Electric Corp:

"The necessity for community relations programs arises not only from the desire to have the community think well of us and our actions but also from the need to have the community act well toward us."

Case in point: Westinghouse's support of a bond issue to improve the Allen County Airport, Lima, Ohio. The company felt that Lima needed a better airport and realized that the proposed improvements were important to Westinghouse as well. (The company's Small Motor Div. has a plant in Lima.)

Headquarters personnel and customers couldn't get to Lima conveniently by air, and the company needed good air express connections to serve customers.

Led by C. C. Shutt, Small Motor Div. vice president, the company gave administrative and fund raising support. The company got employees behind the bond issue, it supported advertising programs; and employees assisted on local programs and made speeches. The airport bond issue was the only one that passed.

Robert T. Scott, manager-community relations for Westinghouse, points out that employee communications and community relations are inseparable (one man heads both at Westinghouse). Mr. Scott reasons: "People in a community get 80 to 85 per cent of their information about a company from their neighbors—the people who work there—not from the newspapers. That's why it's essential to see that employees are adequately informed about company policies—through the house organ, pamphlets, or any other media you may choose."

Westinghouse, like Ford, is decentralized. Plant managers have a high degree of autonomy. They decide how much they will spend on community relations activity, who will handle the job, and how big a staff he will have.

"Our responsibility at headquarters," says Dale McFeatters, vice president-information services, "is to help the plants have successful community relations programs." They do it in a number of ways, including the regular issuance of a community relations newsletter and an instruction sheet telling local managers how to correctly prepare a news release.

• Honors for Maytag—Two important awards were made this year to Maytag Co., Newton, Iowa, for its water conservation and water pollution control and for its support of higher education.

Maytag President George M. Umbreit, explaining how corporations can justify financial aid to education, says: "It is vitally important that we preserve in America the kind of society in which private enterprise may prosper."

Foundrymen Hopeful for '61

Activity in gray iron industry is spotty, but casters see many signs of interest. Record bond approval, increased defense spending, and general improvement portend good year

"THERE'S A LOT of interest building up—customers asking for information, patterns being prepared, equipment being redesigned. When it breaks, we're all going to be busy."

That's a gray iron foundryman talking, and he reflects the optimism of many of his colleagues. Nineteen management group chairmen of the Gray Iron Founders' Society Inc. meeting in Cleveland last Tuesday (Dec. 6) admitted that conditions in their industry are spotty, but on the whole, business is not too bad, and it's going to get better.

- **Doing the Impossible**—Inventory cutting is still one of the biggest problems. Like steel buyers, foundry customers are shifting the inventory burden to producers. Delivery requests are next to impossible.

But orders will increase in the foreseeable future, and leadtimes will lengthen, the foundrymen are convinced. The passage of a record number of bond issues, especially for sewage and water facilities, will help sometime next year. Some expect significant increases in defense business. (Bid requests for ordnance components for delivery next September, October, and November have already been received by some.) Still others look for an across the board improvement sometime in 1961.

Area by area, here is what they report:

- **West Coast**—Huge waterworks and irrigation programs in the next few years will generate large orders for gray iron castings. In Los Angeles, makers of electric motors are ordering steadily. Farm equipment demand is rising. The big problem for West Coast foundrymen is the wave of laws which require them to install air pollution control equipment costing as much as $30,000 to $40,000 a unit. The large outlay for nonproductive improvements in Los Angeles, San Francisco, and Seattle will put a damper on capital expenditures for production equipment the next two years or more.
- **Iowa**—"We watch the hog market. When it is good, farm equipment business picks up. And we had a good year for hogs and corn."
- **Middle Atlantic**—Sun Shipbuilding & Dry Dock Co. recently received orders for four cargo ships which should keep Philadelphia area founders busy for the next couple years.
- **New England**—There are a lot of changes in patterns and equipment, indicating interest is high.
- **Indiana**—Business has been fair for the last three or four months, and it will continue at about that level or better for the next three or four months.
- **Buffalo** — Things are generally slow, but one bright spot is equipment for making paper milk cartons to replace bottles. Another is for equipment to handle the new cartons.
- **South**—One official says 1960 is equal to 1959 (the best year), and it will continue at this rate in the near future.
- **Chicago**—Business is spotty, but some improvement in packaging and bottling machinery is expected early in 1961.
- **Wisconsin** — Foundry activity is uneven and probably will continue so for a while.
- **Minneapolis**—The business level is about as steady here as it is anywhere in the nation.
- **Michigan** — Business is "good." Backlogs are about 90 days.
- **Canada**—Activity dropped off recently. Canada's economy usually follows that of the U. S. about six months on the down side but regains the peaks somewhat quicker. One firm is reported to be getting some German business for heavy and medium weight equipment which will be shipped into the U. S.
- **Capital Spending Off**—Most of the foundrymen agreed that spending for plant and equipment next year will be off slightly because a great deal of modernization has taken place in the last few years. But they were unanimous that there will be a sensational upturn if depreciation laws are liberalized, a promise made by both parties prior to the election.

New Steel Plant to Employ Direct Reduction Process

Iron made from iron bearing desert sand will be available in 1961 when a plant employing the Madaras, direct reduction process is completed for the Arkota Steel Co., Coolidge, Ariz. Reported capacity: 75 tons a day.

Arkota is the first U. S. company to be granted a license for the commercial production of iron and steel by the process invented and developed by Julius D. Madaras, president, Madaras Corp., Detroit.

Ores are reduced to metallic iron in an atmosphere of hydrogen and carbon monoxide (see STEEL, Dec. 1, 1958, p. 78). Coke isn't needed in the reduction process; and scrap isn't needed in conversion of the iron to steel.

The process makes it possible to locate an iron and steel making plant at the source of the ore.

- **Source**—The black sand deposits are between Tucson and Phoenix on a 40,000 acre tract. Mineralogists estimate that it contains 5 to 10 per cent recoverable iron concentrate and as much as 500 million tons of iron ore to a depth of 200 ft.
- **Operation**—The sand is scooped up and charged on a portable magnetic belt to pull out the iron oxide. The resulting concentrate (50 per cent iron) is further processed until iron content averages 68 to 69 per cent.

When the oxygen is removed from the magnetic concentrate, the resulting sponge iron is 94 to 95 per cent iron and 5 to 6 per cent sand. The sponge iron is melted in an electric furnace; the molten sand is fluxed off; and the molten iron is processed into high grade iron and steel in a continuous operation.

President-elect Looks at 'People Efficiency'... How Much Fat in Government Agencies?... New 'Buy American' Order

CAN YOU imagine a firm where the president is elected for a specific term, sometimes as little as one year? And where he is subject to the whims of more than 500 directors, yet must so organize his time as to make a major decision every 5 minutes of his working day?

That is the situation most government regulatory agencies find themselves in: Federal Communications Commission, Federal Power Commission, Federal Trade Commission, Civil Aeronautics Board, Interstate Commerce Commission, National Labor Relations Board, and Securities & Exchange Commission.

This week, James M. Landis, special adviser to President-elect Kennedy, will submit a major report designed to give the U. S. government access to the best people for jobs in those regulatory agencies and the ways and means of promoting their efficient use. The U. S. government is no different from any business: People are its principal assets.

● **NEW CONGRESS WILL ACT**—How bad have matters become? Says Elmer B. Staats, deputy director of the Budget Bureau: The fiscal 1961 budget called for the seven agencies to have an average of one-third more personnel than in fiscal 1956. Employment is up 22 per cent at the Federal Power Commission, almost 49 per cent at the Securities & Exchange Commission. Yet, most metalworking executives with experience in Washington will agree with Mr. Landis' report that decisions are delayed longer than ever, the cost of carrying a case to an agency is mounting every year, and many of the people to be dealt with are not experts in their fields.

Mr. Landis thinks Congress has allowed the agencies too much leeway in organizational matters. Observers expect the new Congress to extend the terms of the members of the commissions, perhaps to ten years, and to attempt to co-ordinate some of the agencies with similar areas of interest—transportation and fuels, for example. Another suggestion to be made by Mr. Landis will meet opposition in Congress, but it may be approved after Congress conducts its own investigation: It would call for the hearing examiners to make final decisions on cases, with the commissioners acting only as appellate judges.

Mr. Staats believes the agencies should be given more freedom to work out their own informal methods of operations, so that most cases would not have to be conducted under courtroom rules of procedure. Much of the work of the agencies may be little more than dickering over procedural detail with the idea that the case will almost certainly end up in court review. Metalworking's interest in the recommendations is best summed up by Mr. Staats: "When decisions are delayed for months, or years, industries are unable to make long range plans, particularly in areas of technological growth." Furthermore, he adds, decisions can take so long they are outmoded by advancing technology when they are issued.

● **DEFENSE REORGANIZATION PLAN**—In another bold stroke to reorganize government personnel along more efficient lines, Sen. Stuart Symington (D., Mo.) reported to Mr. Kennedy last week that the Defense Department should abolish the offices of the civilian secretaries of the services and create what amounts to a unified department at the joint chiefs of staff level. The plan is certain to run into strong opposition on Capitol Hill and at the Pentagon's individual service levels. But the President-elect is expected to push hard for some significant changes.

The Army, Navy, and Air Force would remain single units under the plan, but they would be within a single department, as the Marines today are within the Navy Department. The services would be subject to the direct control of the secretary of defense without interference from intervening civilian service secretaries. A single deputy, the under secretary of defense for weapons systems, would be directly in charge of research, development, production, and procurement of all weapons. Operationally, three commanders would report directly to the new joint staff chairman: A strategic commander (Navy), a tactical commander (Army), and a defense commander (Air Force). Probably the most significant recommendation of all: The secretary of defense would receive all Congressional appropriations and he would decide where to spend the money, rather than having Congress divide it among the three services.

● **NEW 'BUY AMERICAN' ORDER**—About $400 million in foreign aid funds scheduled for spending by the International Cooperation Administration (see STEEL, Nov. 28, p. 76) cannot be used for the purchase of capital goods in Australia, Austria, Belgium, Canada, Denmark, France, Germany, Italy, Hong Kong, Japan, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Union of South Africa, Sweden, Switzerland, or United Kingdom. The money must be spent in the U. S. or in underdeveloped countries. It's the latest move by President Eisenhower to stem the flow of gold overseas, and brings the ICA into line with the Development Loan Fund, which has had a 75 per cent "Buy American" policy for about a year.

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Borderline applications are common for every machining method. Choice of the right one is contingent upon experience and the impartial approach to similar methods and types of equipment. That's why Cincinnati Grinding Specialists can spot the appropriate grinding application so quickly. These men are thoroughly familiar with and can recommend:

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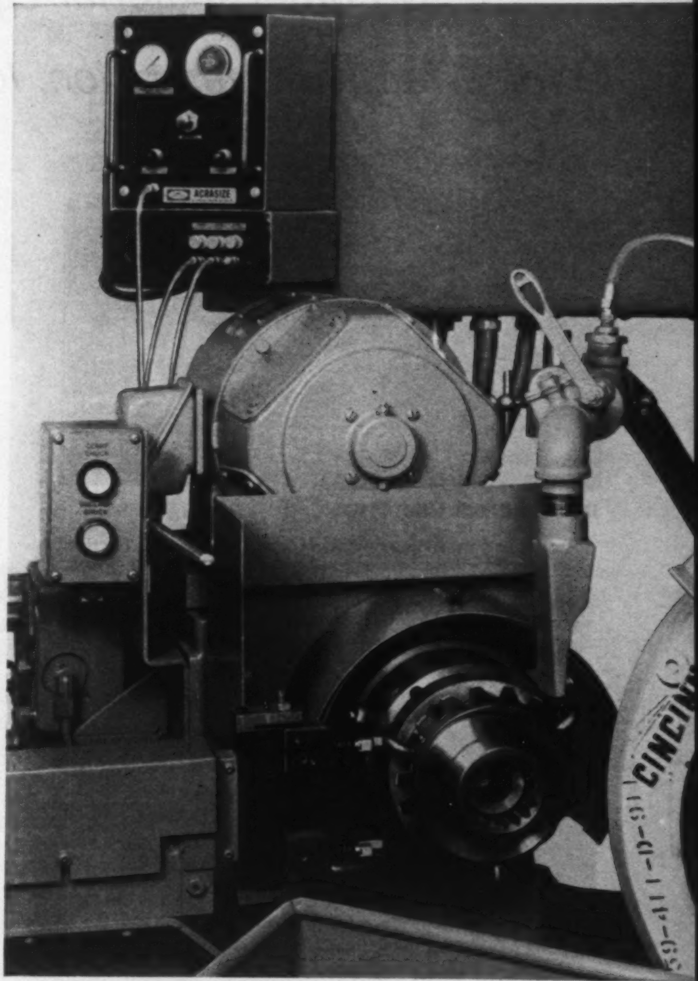
- Centerless grinding
- Micro-Centric grinding
- Angular wheel slide grinding
- Chucking grinding

Let's consider chucking grinding, and the many reasons why Cincinnati can give you the finest machines and engineering service for this type of work. First of all, the grinding wheel spindle runs on Cincinnati's famous FILMATIC bearings, over 99% of which have never required adjustment or replacement. A super-accurate headstock spindle puts Cincinnati chucking grinding in the precision accuracy bracket of other methods. Automatic dual rate infeed (standard equipment) combines rapid metal removal with accurate sizing. The two-spindle headstock is recommended for difficult-to-load parts. With this type of equipment, loading and grinding proceed simultaneously.

Cincinnati's Cimtrol Division engineers the gaging equipment, giving you the advantage of single responsibility. "Jump-on" gaging, a unique type of size control, is one of the profitable features of the CINCINNATI Chucking Grinder illustrated at the right. Other machines and the types of work they are performing are found in catalog No. G-685. May we send you a copy? **Grinding Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**



"Jump-on" gage unit, a product of Cincinnati Milling's Cimtrol Division, calls the signals for sizing and automatic cycle grinding. This CINCINNATI FILMATIC No. 2 Chucking Grinder is arranged to grind four sizes of parts.

Part name .... Bevel gear
Operation .... Grind diameter and adjacent face
Production .... 72 per hour

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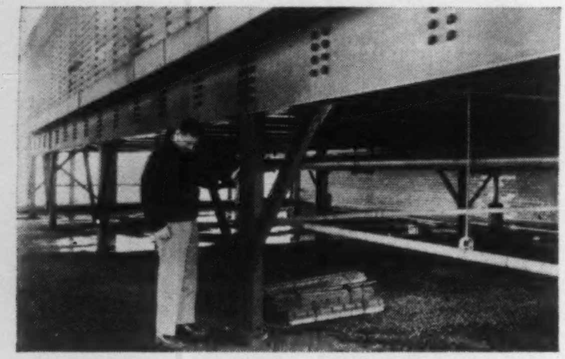
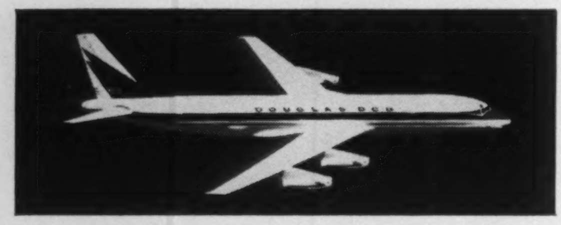


IN DAMPING VIBRATION

Lead anti-vibration pads have proved an effective barrier to vibration created by railroad trains, printing presses, commerical laundry equipment and similar machinery. In the installation shown here, the roof-top cooling tower for an air conditioning system is mounted on lead pads which isolate the vibration from the building.

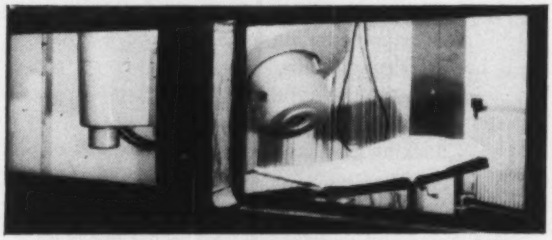


IN QUIETING NOISE

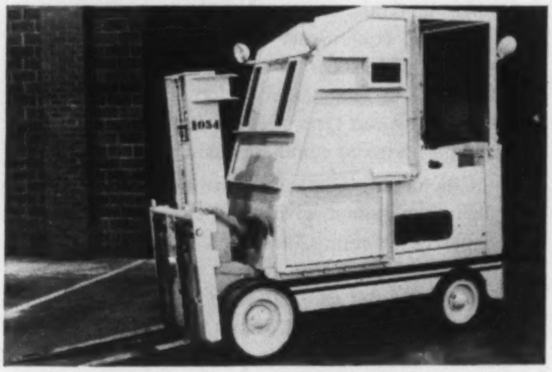
Because it is a dense, limp material, lead is an excellent sound attenuator and isolator. In powder form it is impregnated into the vinyl covering of a new acoustical fabric used to cut down engine roar in both conventional and jet airliners. This leaded fabric is also being used for sound attenuation in other applications such as electric typewriters.

IN RADIATION SHIELDING

X-RAY — Lead has long been the standard material for protection against harmful exposure to X-rays. It is used in the floors, walls, ceilings, doors and windows of X-ray rooms, in the protective clothing for technicians and in the beam-shaping apparatus of the machine itself.



GAMMA RAYS — Attenuation of gamma radiation is directly proportional to the density of the shield. Since lead is the densest of all commonly available materials, it gives the best protection per unit of thickness at lowest cost. It is widely used in nuclear reactors, radioactive waste containers and nuclear laboratories. Photo shows a lead-shielded fork lift truck with leaded glass viewing ports, used for transporting radioactive materials.



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FOREIGN ROUNDUP

EUROPE

U.S. Metalworking Exports to West Europe in 1959

(Millions of dollars)

	Metals & Metal Manufactures	Machinery & Vehicles
Austria	6.4	23.2
Belgium-Luxembourg	10.0	70.3
Denmark	2.1	17.1
Finland	2.3	24.6
France	36.1	105.7
Greece	1.5	13.2
Ireland	0.4	3.0
Italy	33.9	71.9
Netherlands	21.1	55.2
Norway	4.5	17.4
Portugal	0.9	8.3
Spain	5.7	21.8
Sweden	19.9	72.7
Switzerland	9.9	41.4
United Kingdom	73.8	114.3
West Germany	70.3	117.6

Source: Department of Commerce.

European Sales Battle Gets Tougher

WESTERN EUROPE has become a mass consumption market. European industry has geared for mass production to feed that market. It's turning out technically advanced and competitively priced products. Competition has become tough. Nevertheless, aggressive U. S. firms will continue to find markets for their goods across the Atlantic.

Growth of consumer credit and sales of appliances and automobiles attest to the boom. McCann-Erickson Inc., New York advertising firm, reports the consumer market is climbing toward the $350 billion mark. But existing manufacturing facilities are not able to meet all consumer wants, which observers say will continue to be the driving force behind European prosperity.

U. S. sales to Western Europe were up 50 per cent in the first half of this year compared with the same period of 1959. The outlook for 1961 is cheering. Exporters report inquiries and orders are rising.

• **Growth Tops U. S.**—Economists predict Western Europe's expansion will maintain a faster pace than that of the U. S. in the coming years. Gross national product of members of the Organization for European Economic Co-operation rose at an average annual rate of 4.5 per cent in the last decade. The U. S. rate for the same period was 3 per cent.

• **Trade Groups Advance**—The European Common Market (ECM includes Belgium, France, Italy, Luxembourg, The Netherlands, and West Germany) and the European Free Trade Association (EFTA includes Austria, Denmark, Norway, Portugal, Sweden, Switzerland, and United Kingdom) are moving quickly. Although firms established within the boundaries of the trade groups will reap the greatest dividends, the trend toward relaxed trade barriers will benefit many exporters.

ECM tariff action is well ahead of schedule. Members will reduce tariffs among themselves by an average of 20 per cent before Dec. 31. Goal: Elimination of trade walls among the six so that internal trade will be as simple as it is among the states in the U. S. The group is also moving toward a common external tariff. It will be done in three steps. The first will take place Dec. 31, a full year ahead of schedule. Each ECM country will adjust its tariff 30 per cent of the way toward the common tariff. More action will be taken (a 20 per cent reduction in the ECM common tariff) next year if the U. S., Britain, and other members of the General Agreement on Tariffs & Trade offer reciprocal concessions.

The EFTA has started reducing tariffs and eliminating quotas between members. No move toward a common external tariff has begun. Finland is expected to join the group soon.

Here's a brief country by country rundown on economic conditions in Western Europe:

- **Belgium** — Sales of consumer goods, notably automobiles, television sets, and washing machines, have been rising. But the Belgian economy has expanded slowly. Reason: Little diversification. The economy is heavily based on coal and steel.

Nevertheless, imports in the first nine months of this year were up 17.5 per cent over the like period of 1959. Last year's imports totaled $3.5 billion, of which the U. S. supplied 10 per cent.

Major U. S. metalworking products showing an upturn in the Belgian-Luxembourgian market are: Electrical equipment and apparatus, power generating equipment, construction, excavating, and mining machinery, textile, sewing, and shoe machinery, and metal cutting machines. Major competitors for the Belgian - Luxembourgian market are West Germany, The Netherlands, and France.

- **France**—Gross national product rose from $34 billion in 1955 to $45 billion in 1958 when France experienced a mild recession. Consumer spending increased from $22.4 billion to $31.2 billion during the same period. Industrial output recovered strongly last year. Another downturn was registered in the first half of 1960, but a pickup in retail sales has sparked a strong seasonal fall recovery.

Because of excess capacity, businessmen are cautious. Industrial production will be up about 6 per cent this year and investments will

Selected Metalworking Exports

MILLIONS OF DOLLARS

BELGIUM

COUNTRY & PRODUCTS	1959	1958	1957	1956
Iron & steel mill products	2.8	3.4	7.1	7.2
Copper, semifabricated & scrap	0.2	1.2	0.8	0.2
Electrical machinery & apparatus	12.4	8.7	9.8	9.9
Industrial machinery	26.0	24.1	30.1	28.1
Construction, excavating & mining machinery	5.0	4.1	6.3	7.1
Manufacturing & service industry machinery	8.3	9.0	11.0	10.3

FRANCE

COUNTRY & PRODUCTS	1959	1958	1957	1956
Iron & steel mill products	0.6	1.2	5.2	3.1
Copper, semifabricated & scrap	24.8	46.1	35.7	52.4
Electrical machinery & apparatus	14.4	15.7	13.3	12.5
Industrial machinery	51.3	73.0	89.3	72.2
Construction, excavating & mining machinery	14.7	15.7	19.7	18.9
Manufacturing & service industry machinery	18.0	25.9	26.7	19.3

ITALY

COUNTRY & PRODUCTS	1959	1958	1957	1956
Iron & steel mill products	5.7	6.2	12.7	13.2
Copper, semifabricated & scrap	9.4	16.1	20.8	22.7
Electrical machinery & apparatus	21.6	21.2	19.0	14.6
Industrial machinery	39.1	49.5	58.4	46.9
Construction, excavating & mining machinery	6.5	7.1	8.4	10.7
Manufacturing & service industry machinery	20.3	23.9	24.0	16.4

NETHERLANDS

COUNTRY & PRODUCTS	1959	1958	1957	1956
Iron & steel mill products	8.4	12.1	18.3	19.6
Copper, semifabricated & scrap	4.2	7.8	5.4	7.7
Electrical machinery & apparatus	6.6	6.1	6.2	5.9
Industrial machinery	24.9	21.8	30.3	29.4
Construction, excavating & mining machinery	3.8	6.0	4.6	4.7
Manufacturing & service industry machinery	12.3	9.4	11.4	11.3

NORWAY

COUNTRY & PRODUCTS	1959	1958	1957	1956
Iron & steel mill products	1.4	2.5	7.1	6.1
Copper, semifabricated & scrap	1.0	2.1	2.3	2.3
Electrical machinery & apparatus	2.0	1.5	3.6	1.5
Industrial machinery	9.1	8.4	8.6	6.9
Construction, excavating & mining machinery	4.3	3.1	3.8	2.9
Manufacturing & service industry machinery	2.6	2.6	2.8	2.0

Source: Department of Commerce.

to Western Europe

COUNTRY & PRODUCTS	MILLIONS OF DOLLARS			
	1959	1958	1957	1956
SPAIN				
Iron & steel mill products	0.5	2.0	4.3	4.5
Copper, semifabricated & scrap	0.7	1.2	3.6	3.6
Electrical machinery & apparatus	6.0	6.2	16.8	8.4
Industrial machinery	10.9	15.8	22.7	38.0
Construction, excavating & mining machinery	1.8	3.4	4.8	7.1
Manufacturing & service industry machinery	3.6	3.1	6.5	11.2
SWEDEN				
Iron & steel mill products	9.5	6.7	12.6	5.9
Copper, semifabricated & scrap	0.8	3.8	1.4	1.5
Electrical machinery & apparatus	9.6	8.6	9.9	6.0
Industrial machinery	33.2	27.9	25.0	22.9
Construction, excavating & mining machinery	11.9	9.7	8.2	7.8
Manufacturing & service industry machinery	10.5	9.0	11.2	9.2
SWITZERLAND				
Iron & steel mill products	2.9	4.9	18.6	12.1
Copper, semifabricated & scrap	1.1	5.8	9.1	13.6
Electrical machinery & apparatus	8.4	6.8	7.2	6.2
Industrial machinery	16.7	14.9	18.2	18.9
Construction, excavating & mining machinery	8.1	6.4	5.8	7.9
Manufacturing & service industry machinery	5.9	4.9	6.7	5.2
UNITED KINGDOM				
Iron & steel mill products	6.3	16.9	48.2	47.1
Copper, semifabricated & scrap	15.0	56.7	53.7	12.1
Electrical machinery & apparatus	20.2	10.4	8.5	10.1
Industrial machinery	68.8	63.7	78.0	72.9
Construction, excavating & mining machinery	16.5	16.1	23.6	13.4
Manufacturing & service industry machinery	21.8	20.0	16.8	15.8
WEST GERMANY				
Iron & steel mill products	12.5	23.2	24.3	16.9
Copper, semifabricated & scrap	24.4	37.9	35.2	34.6
Electrical machinery & apparatus	18.3	12.0	7.7	6.5
Industrial machinery	64.7	50.6	46.5	40.8
Construction, excavating & mining machinery	11.8	11.5	11.0	10.3
Manufacturing & service industry machinery	19.0	17.8	14.4	8.0

show an 8 per cent upturn.

Imports from the U. S., which account for 11 per cent of the total, were up 77 per cent in the first seven months of this year, equaling $435.4 million. Boosting the market: France will eliminate quantitative restrictions on imports of industrial products from the U. S. within two years. Machines and industrial equipment make up 11 per cent of all French imports, iron and steel products account for 5.7 per cent, and nonferrous metals tally 5.5 per cent.

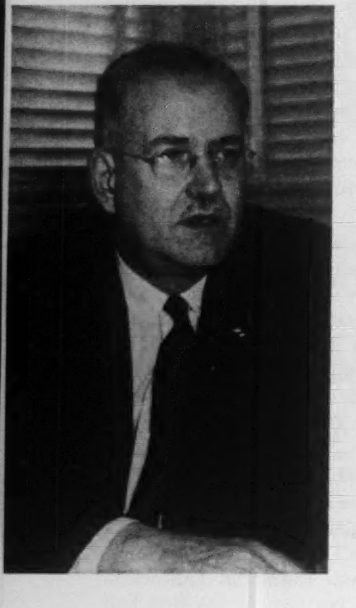
U. S. exports to France generally fell last year, but increases were recorded by office machinery, agricultural machinery, and tractors. In addition to the U. S., West Germany, Belgium, Luxembourg, and the United Kingdom are France's leading suppliers.

- **Italy**—Despite the problems of the depressed south, the industrial north is giving Italy's economy a sound base from which to make great strides. Industrial production jumped 18 per cent in the first half of 1960 over the comparable period of last year. Although most engineering industries, particularly motor vehicles, pig iron, and raw steel manufacturers show great gains this year, imports spiraled up 44.7 per cent in the first half. Imports of iron ore were up more than one-third. Pig iron and iron and steel scrap imports increased about one-third. Large increases were registered in imports of nonferrous scrap, metals, and their alloys; steel goods, machine tools, nonelectrical, agricultural, mining, metalworking, and textile machinery.

- **The Netherlands**—Private expenditure as a part of gross national product in The Netherlands is one of Europe's smallest. But diversification is the byword, and output was up 5 per cent in the first quarter of this year. Imports totaled $3.9 billion last year, with the U. S. accounting for 11 per cent of the total. U. S. imports were mainly industrial machinery and parts, electrical and office machinery. Sales of metal cutting machines and shipments in the aluminum ore and semifabricated aluminum category were up significantly last year.

- **West Germany**—The economy,

Europeans Eager for Good Products



You'll have no trouble selling a good product in Europe, says J. H. Reighart, president of Sticker Industrial Supply Corp., Reighart Steel Products Corp., Correct-Air Corp., and chairman of James Campbell Smith Inc., all of Cleveland.

Just back from a European business trip, he found that German managers in particular are quick to buy equipment in which they see a benefit. There seems to be less purchasing red tape involved and more decisive authority at each level of management in German firms than in this country.

The attitudes of the German managers and workers also impressed the Clevelander. "Executives conduct themselves as though they were owners of the firms. Salaried people are devoted to their jobs. Workers are intensely loyal to their companies. We need more of these attitudes particularly in the laboring ranks, in this country."

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at a peak for some time, shows no sign of slackening. Although industrial output was up 9 per cent through August of this year and gross national product rose 5.7 per cent in 1959, output has reached capacity in many industries. Capital investment has been intensified, not only to boost capacity, but to increase automation in an attempt to solve the problems created by an acute labor shortage. Italian workers have been imported to fill some vacancies.

At midyear, U. S. exports to the Federal Republic reached $687.8 million vs. $440.5 million for the same period of 1959. Trade liberalization and the sound economy have been the primary movers in the stepped up demand. That is encouraging U. S. firms who saw their German sales slip 6 per cent last year to drop their share of the German imports to 14.9 per cent. Despite the over-all drop, many metalworking categories registered gains last year. Electrical machinery and apparatus, power generating equipment, metal forming machines, metalworking machinery, and agricultural machinery and implements all showed substantial increases. Imports of tractors were also up as were imports in the aluminum ore and semifabricated aluminum grouping.

• **United Kingdom**—Despite concern created by a slowdown in the third quarter, the economy is strong. Automakers have cut back but are still going ahead with plans for new plants in Wales and Scotland. Other metal using industries are still operating at high rates and confidence is high. Steel and pig iron output reached records in October. And although the auto slack dropped demand for sheets (much tonnage was imported), domestic sheetmakers are still booked through the first quarter.

Steelmakers are going ahead with plans to expand output next year. Rolling mills will be busy through next spring. The machine tool industry is at peak and suppliers of specialty steels are behind on deliveries. Demand for capital goods is strong. Heavy electrical equipment manufacturers say they have enough work to provide full employment for two to three years.

As a result of Britain's trade liberalization, U. S. exports are at high levels. Imports of manufactured goods show the greatest increase. Shipments of U. S. autos were up 76 per cent in the first quarter. Opportunities are seen for refrigerators and other household electrical equipment and kitchen gadgets. In 1959, U. S. sales of office, textile, sewing, and shoe machinery were above 1958 levels. Sales of electrical machinery and apparatus nearly doubled. Imports in the aluminum ore and semifabricated aluminum category more than doubled.

• **Scandinavia** — The northern countries are enjoying so much prosperity that attempts have been made to moderate investments in Sweden and Denmark. Sweden offers a highly developed market for consumer goods. The Swedes own more cars and telephones per thousand than any other European Free Trade Association country. The market for capital goods, machine tools, power generating equipment, and agricultural machinery is strong. U. S. imports in most major metalworking categories were up in 1959 over 1958.

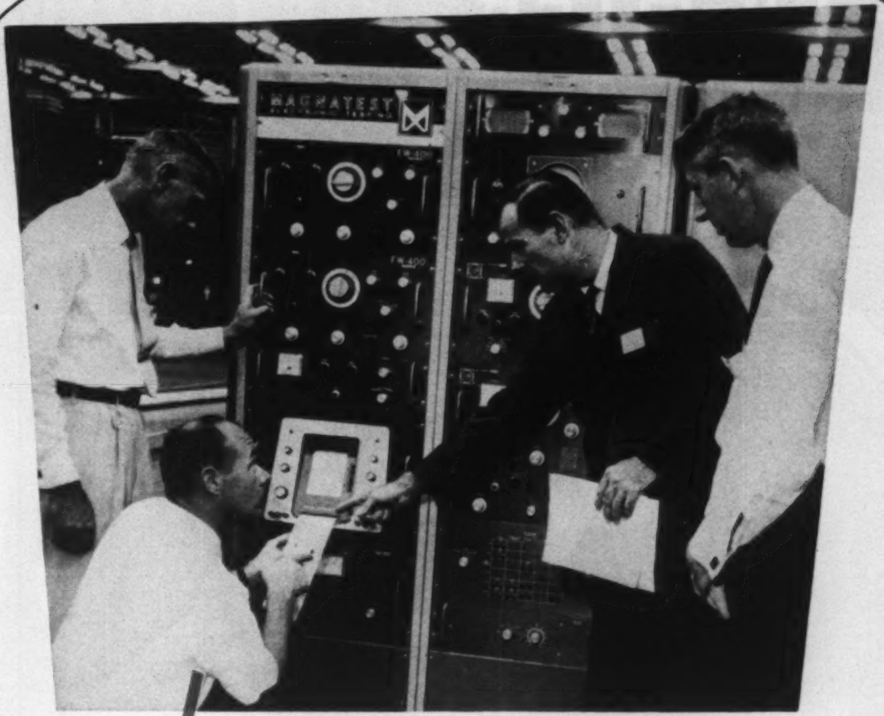
Norway's mining, manufacturing, and construction industries are increasing activity by 5 per cent this year. A good market is available for U. S. construction, excavating, and mining machinery, tractors, and electrical apparatus and machinery.

Denmark bought increased quantities of power generating and industrial machinery from the U. S. last year.

In addition to inter-Scandinavian trade, West Germany and the United Kingdom are major competitors in the northern market.

• **Austria**—Industry here has grown faster since 1951 than any country in Western Europe except West Germany. Imports from U. S. metalworkers, particularly metalworking machines and electrical machinery and apparatus, are increasing. Swiss purchases of U. S. electrical, construction, and industrial machinery were up last year.

Another Test System at work...



Magnatest FW-400 performs as planned at CONVAIR/FORT WORTH, *a Division of General Dynamics. Here, working out the equipment, are (left to right) Wm. L. Bierwirth, Quality Control Engineer for Convair, Sam Vance and Jack Harrer, Field Engineer and Branch Manager for Magnaflux, and B. E. Justice, Convair Inspection Superintendent.*

Test Critical Tubing with Eddy Currents – 1/8″ to 6″ O.D. – Up to 600 ft./Min.

This Magnatest FW-400 eddy current test instrument is used for both research and production testing of critical stainless steel and aluminum tubing. Broad and multiple-purpose, it is just one of a variety of Magnatest units in use to test nonmagnetic tube, rod and wire—for seams, inclusions, voids, concentrated porosity, embrittled areas, slivers, laps, etc.

Eddy currents are induced in the material to report the defects to the detection 'scope and/or other readouts in the instruments. Full automatic feed and marking at mill speeds can be provided.

An FW-400 is as flexible as you need it to be! Modular panel design provides customized testing with little special engineering. Many installations start with only three panels: power supply, the oscilloscope and controls, and the frequency oscillator panel for the detection coil assembly. Depending upon your need, pen recorder, audible and visual alarms, automatic marking of defects and still other functions may be included or added later in simple, building-block fashion.

For full data phone our local Field Engineer, or write to
Magnaflux Corporation, 7312 W. Lawrence Avenue, Chicago 31, Illinois.

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TEST SYSTEMS
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MX Test Systems Include MAGNETIC PARTICLE, FLUORESCENT PENETRANT, THERMOGRAPHIC, EDDY CURRENT, ULTRASONIC, STRESS ANALYSIS, RADIOGRAPHIC TESTING, DYE PENETRANT & MAGNETIC FIELD

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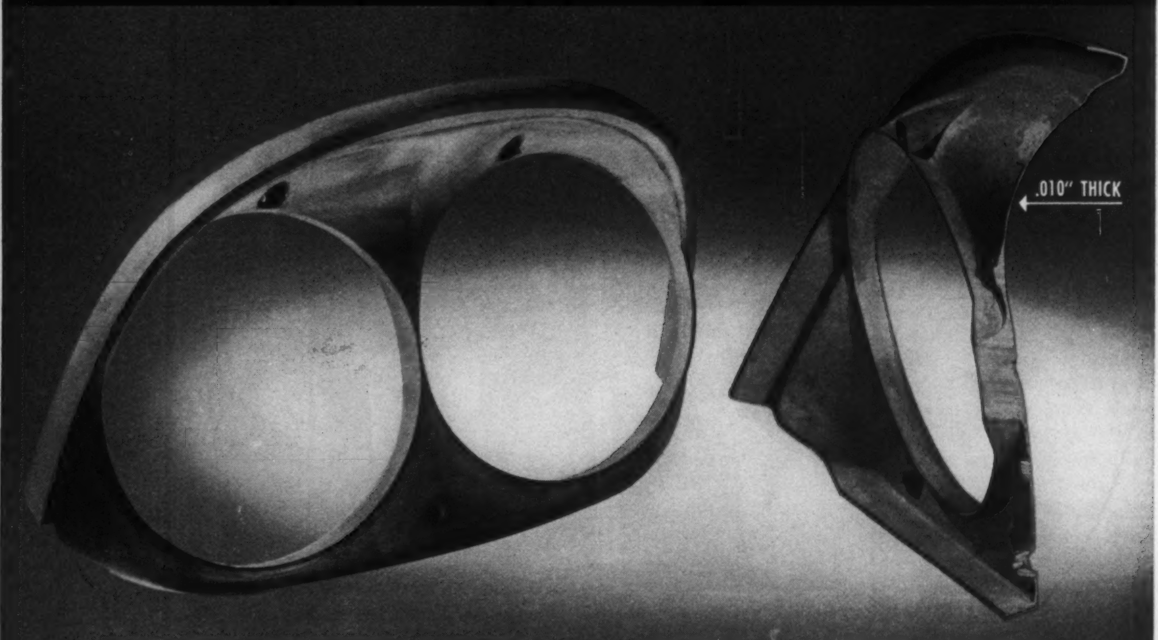

SMOOTH-FLOWING DESIGN . . . BRIGHT, LASTING FINISH
RIGID . . . DURABLE . . . ECONOMICAL

. . . WHEN DIE CAST with ZAMAK

Airfoil sculptured styling of today's automobiles demands parts designed to complement flowing body and fender lines.

ONLY ZINC DIE CASTING ALLOYS can produce the intricate shapes and smooth, compound-curve surfaces—as in this headlight door — with the necessary thin-wall sections, strength, rigidity and production economy.

Improved techniques in chromium plating on Zamak die cast parts provide a more permanent bright finish with greater resistance to corrosion than ever before.

The weight-saving advantages of ZINC die castings, with built-in qualities of durability and economy, point up the important reasons why Zamak has become the leading material for the production of die cast parts in today's automobiles.

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HORSE HEAD PRODUCTS ®

Venders' Share of Auto Business Slides

THE SUPPLIER of automotive parts is still feeling the squeeze of captive shops. If supplier beliefs are valid, their share of the part business will diminish another 5 per cent between now and 1965, a 16 per cent drop from 1955 levels.

STEEL queried 100 of the leading independent automotive venders who make a variety of metal products. Nearly 52 per cent of the respondents feel they'll be getting a lower percentage of the auto business by 1965; 30 per cent expect their share to remain the same; and 18 per cent say they'll be getting more contracts.

Percentage of Sales Going to Automakers

PRODUCT	1965	1961	1960	1959	1955
Stampings	49	55	52	67	68
Castings	40	51	53	53	59
Forgings	38	42	42	40	51
Extrusions	40	41	36	42	46
Others	37	43	46	49	61

- **The Causes**—Venders still place most of the blame on the captive shops. But a substantial number of the suppliers (26 per cent) say their losses have been created by material and design changes. Other factors include: Foreign competition, decentralization by auto firms, poor supplier relations—and one company president frankly admitted he wasn't able to meet the stiffer quality demands of the carbuilders.

- **Fighting Back**—"This division is practically out of the automotive field. We'd like to keep it that way," replied one supplier. But he was the exception. Most are fighting back.

Nearly a third of the respondents said they are buying new equipment and modernizing tooling and facilities to get more competitive. About 11 per cent are putting additional emphasis on research and development. Another 23 per cent are working on nonautomotive products to boost sales.

In last year's survey, nearly 10 per cent of the respondents listed plant relocation as one approach to recapturing business. No firm reported such plans this year.

AMC Sales Climb; But Profits Dip

American Motors Corp. built more cars in the fiscal year ended Sept. 30 than it did in the comparable 1959 period, but it made less money because of the profit squeeze. However, the company looks for continued growth and has reorganized top management functions to prepare for it.

George Romney, president, says AMC sold 464,790 Ramblers in fiscal 1960, an increase of 25.8 per cent over the 1959 mark. Combined Rambler and Metropolitan sales hit 478,249. The company's share of the market rose from 5.8 to 6.6 per cent.

Although the company passed the $1 billion level in sales (vs. $869.8 million last year), its net earnings after taxes were $48.2 million (vs. $60 million in 1959). Higher taxes, increased operating costs, and a 1.3 per cent drop in appliance sales were responsible. The smaller return equals $2.68 per share against 1959's $2.76.

Mr. Romney says AMC paid $57.2 million in taxes this year vs. $45.1 million last year when it had a $10.8 million tax loss carryover. The company spent $31 million for plant and equipment to boost car production capacity to 600,000 units, but the program did not entirely relieve the added costs of overtime operations and extra shifts. Employment averaged 30,255, a 19 per cent increase over the 1959 figure. The annual payroll came to $203.7 million compared with last year's $164.8 million. AMC has paid off another $3 million on its long term debt, dropping the balance due to $7 million. It has no current bank debt and made a 3 for 1 stock split during the year.

- **New Jobs**—Looking ahead, Mr.

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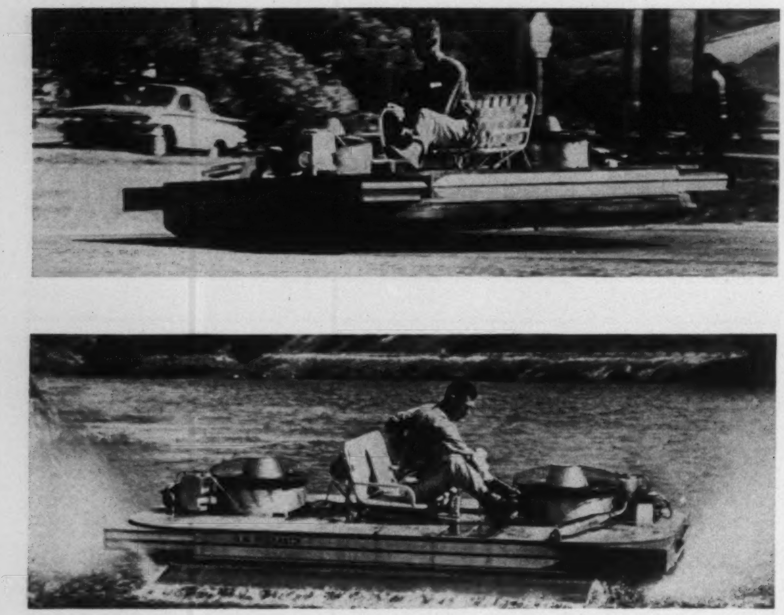

A GROUND EFFECT MACHINE (GEM) that "travels on air" has been brought out by General Motors Corp. Tested by the Engineering Development Dept. at GM's Research Laboratories, the 144 in. long vehicle skims over land and water at a 4 in. altitude. A low pressure air bubble holds the machine above the surface. The bubble is sealed beneath the vehicle by a continuous sheet of air from an annular jet around the bottom of the machine. Fore and aft fans driven by 15 hp engines produce the air seal

Romney announced a realignment of top executive jobs. Instead of maintaining separate heads for the appliance and auto divisions, he has reorganized the top jobs on a functional basis. A third executive vice president and three more vice presidents have been elected.

Roy D. Chapin Jr., executive vice president, will now be responsible for fiscal and international activities in both auto and appliance fields. He has been in charge of the automotive division. Bernard A. Chapman will be executive vice president in charge of all automotive and appliance manufacturing, engineering, styling, and procurement. He previously headed up appliance activities. Roy A. Abernethy has been promoted to executive vice president and will handle marketing and distribution for appliances, as well as autos.

John W. Raisbeck has been elected vice president, sales operations. Richard T. Purdy, treasurer, and Donald P. Else, comptroller, have also been elected vice presidents.

L. A. Townsend Gets Key Post at Chrysler

Across town in Hamtramck, Chrysler Corp. announced that Lynn A. Townsend has been appointed to the No. 2 job, administrative vice president. Presumably, he is now directly in line for promotion to company president when L. L. Colbert relinquishes that job to devote full time as chairman.

Mr. Townsend, who is 41, has been group vice president in charge of international operations. He'll continue to head up those responsibilities in addition to directing Chrysler's administrative affairs. He has been with the corporation only three years. Edgar Roe, first vice president, will retire in January under the company's compulsory retirement rule. He'll be 65 Jan. 10.

Besides picking a new administrative head, Chrysler also announced it will pay an extra 50 cent dividend, bringing the year's dividend payments to $1.50 vs. $1 during 1959. Mr. Colbert says the company's current net assets total $385 million against $275 million last year. Cash and short term marketable securities amount to $299 million compared with $194 million in 1959. Chrysler built 1.03 million cars and trucks through November of this year. Last year's 11 month total was 743,367.

Continental Sales Success Predicted by Researcher

"The Lincoln Continental will be the auto sales success story of 1961."

That's the prediction of Louis Cheskin, Chicago motivational researcher, who predicted the demise of Ford Motor Co.'s Edsel when it was introduced.

Two factors favoring the Continental's success: 1. Styling—Mr. Cheskin says the buyer today is rebelling against ostentatiousness and wants simplicity and functionalism. 2. Product confidence—the car's 24,000 mile guarantee means reliability to the buyer.

U. S. Auto Output

Passenger Only

	1960	1959
January	688,731	545,756
February	659,323	478,518
March	654,242	576,080
April	582,909	578,846
May	611,226	546,817
June	613,147	557,995
July	434,377	555,410
August	305,527	239,152
September	407,685	258,151
October	617,816	507,527
November	597,132	254,527
11 Mo. Totals	6,172,115	5,098,779
December	......	494,931
Total	......	5,593,707

Week Ended	1960	1959
Nov. 5	145,537	63,451
Nov. 12	138,682	64,233
Nov. 19	149,753	68,476
Nov. 26	111,091	46,740
Dec. 3	139,407†	55,337
Dec. 10	137,000*	86,056

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

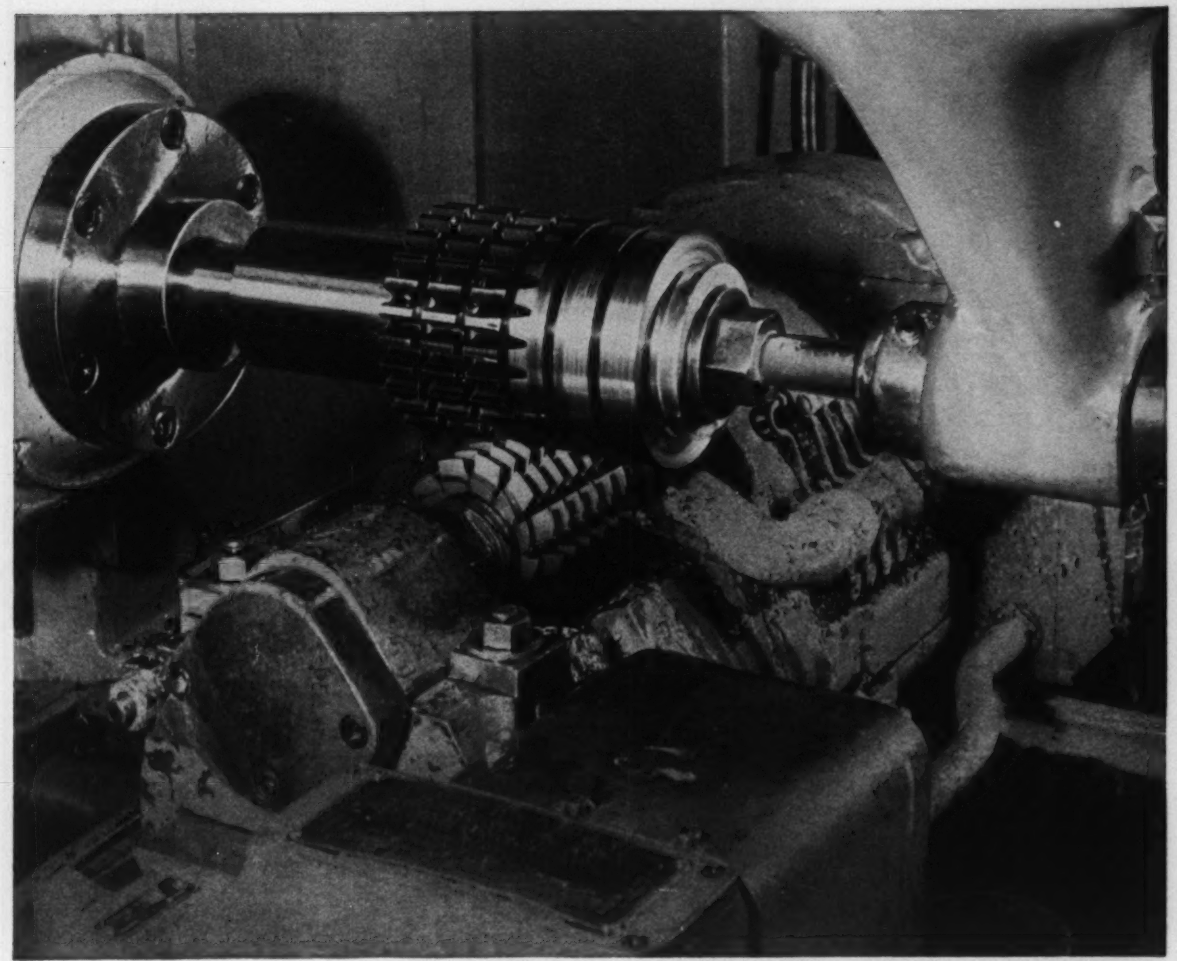

Photo courtesy Chelsea Products, Inc.

Aristoloy Leaded Steel provides free machining for Chelsea Products, Inc.

Steel for gears used in power take-off assemblies must have uniform hard surface, high tensile strength and yet machine freely. Aristoloy Leaded* users have benefited from these qualities.

Chelsea finds more gears can be cut from leaded Aristoloy before the hob needs sharpening. Production can be improved and speeds and feeds increased over non-leaded steel. Strength and hardness are not affected and the finished part reveals no detectable difference in physical properties from steel previously used.

For complete information call the Copperweld representative in your nearest large city . . . or write today for New Products & Facilities Catalog.

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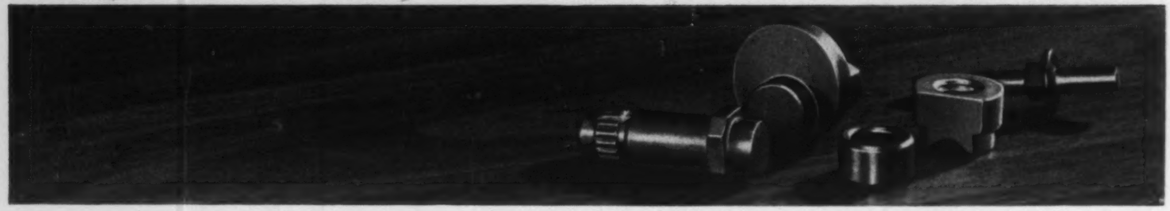
Gains special part at half cost



RB&W survey seeks out ways to economize with cold formed special parts as well as with standard fasteners

Standard fasteners and many cold formed parts are closely related. They're offspring of the same machine. When called in to survey fastener usage, therefore, the RB&W Man can also ferret out those special parts which could be produced faster and for less money on RB&W's cold headers or nut formers.

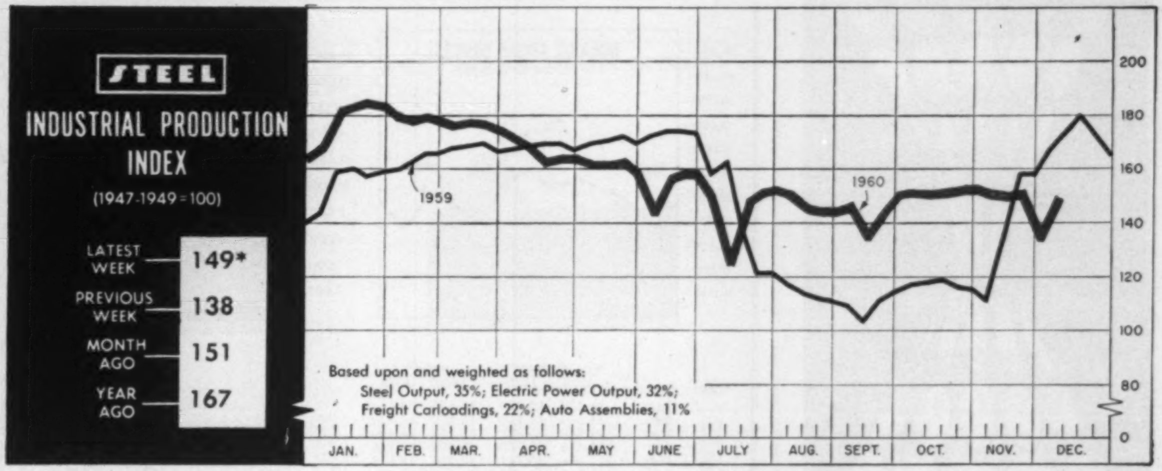
The hand-held part above, for example, is a car trunk hinge spacer. Its cost was cut 50% when RB&W cold-formers took on the job of pounding them out at high speed, smoothly finished, and ready for installation.

By buying such parts, instead of making them, you save in one or more ways. (1) There's less machining time—or none at all. (2) Assemblies of several small pieces can be made as a unit—reducing assembly costs. (3) When shape of piece is such that you would have to machine excessively from relatively large diameter rod, you avoid heavy scrap loss. Sometimes cold forming becomes the *only* way to economically produce a piece—as for example, the eccentric cam shown above.

To get the most from your dollar in standard fasteners or specials, find out what the RB&W Fastener Specialist can do in cooperation with your engineers. Or write about your requirements in special parts directly to Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N.Y.

RB&W
116th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Sales office and warehouse at:** San Francisco, Calif. **Sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas. **Sales agents at:** Cleveland; Milwaukee; New Orleans; Denver; Fargo. **Distributors coast to coast.**



*Week ended Dec. 3.

Production Recovery Pegged in May

THE UPTURN in industrial production is just six months away. Between now and then you can expect the mildest recession of the postwar period.

That's how 15 members of the Business Statistics Section, Cleveland chapter of the American Statistical Association, see conditions in the next 12 months. The economists and market researchers look for the low point of this cycle to come in March and April, with a slight rise starting in May and gaining momentum toward yearend.

- **Specifics**—Starting with November (data are not yet available for last month), here is what the forecasters expect of the Federal Reserve Board's industrial production index (1957=100):

1960	Median	High	Low
Nov.	105	106	104
Dec.	105	105	101
1961			
Jan.	103	106	98
Feb.	103	107	96
Mar.	101	109	95
Apr.	101	110	98
May	102	110	98
June	102	110	99
July	103	112	100
Aug.	105	113	100
Sept.	106	115	102
Oct.	107	115	103

(The median is that point at which half of the estimates are above and half below.)

The spread indicates that over the short term, sentiment favors the bears. (The low estimates are farther away from the median than the highs.) But from March on, there is a definite bullish sentiment with several estimates falling in the 112 to 115 range.

- **Reasons**—Those who are relatively optimistic continue to point out that few, if any, of the excesses characteristic of postwar booms developed in the economy following

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,376[1]	1,393	2,732
Electric Power Distributed (million kw-hr)	14,300[1]	13,500	13,907
Bituminous Coal Output (1000 tons)	6,400[1]	7,980	8,151
Crude Oil Production (daily avg—1000 bbl)	6,980[1]	6,992	7,026
Construction Volume (*ENR*—millions)	$385.0	$613.4	$388.4
Auto, Truck Output, U. S., Canada (*Ward's*) ..	171,129[1]	136,299	70,250
TRADE			
Freight Carloadings (1000 Cars)	550[1]	471	650
Intercity Truck Tonnage (changes from year ago)	−5.6%	−2.2%	+2.8%
Business Failures (Dun & Bradstreet)	276	329	268
Currency in Circulation (millions)[3]	$32,638	$32,532	$32,444
Dept. Store Sales (changes from year ago)[3]	−2%	−7%	+3%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$22,733	$29,510	$23,955
Federal Gross Debt (billions)	$290.6	$290.1	$290.6
Bond Volume, NYSE (millions)	$30.9	$21.5	$37.4
Stocks Sales, NYSE (thousands of shares)	16,809	12,710	18,033
Loans and Investments (billions)[4]	$106.9	$107.3	$102.8
U. S. Govt. Obligations Held (billions)[4]	$29.0	$29.1	$27.2
PRICES			
Steel's Finished Steel Price Index[5]	247.82	247.82	247.82
Steel's Nonferrous Metal Price Index[6]	221.8	222.0	231.2
All Commodities[7]	119.6	119.6	118.9
Commodities Other than Farm & Foods[7]	127.8	127.8	128.6

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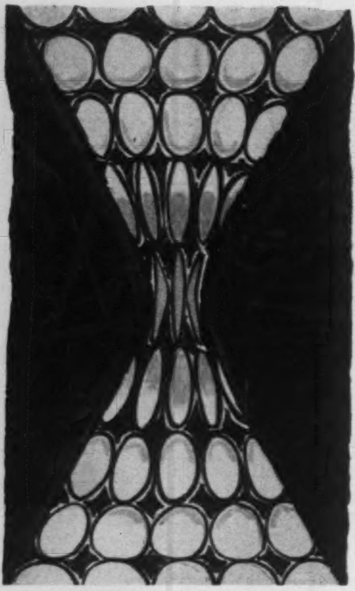
*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,849,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.



BRMCO 3004 STRIP ALUMINUM MATCHES 5052...

SAVES COMPANIES $40.00 A TON

A top electrical equipment manufacturer, wanting to reduce production costs, asked BRMCO and several other leading mills to develop a 3004 strip aluminum to replace the 5052 they were using. Because of a critical forming operation, they required a tensile strength within 37,000-42,000 psi, with a 5% minimum elongation.

BRMCO field engineers, metallurgists and production men attacked this difficult problem, realigned strip production methods and quickly produced a 3004 strip with the required tensile strength and with an elongation factor well above the minimum requirement.

BRMCO now can save all manufacturers $40.00 a ton in strip aluminum costs by supplying them these 5052 characteristics in a lower cost alloy.

This same technical assistance can cut your nonferrous strip costs, increase your production. Write or call today, without obligation. If you phone, call EDison 7-4434 (Bridgeport—collect) and ask for Larry Hayden, field service department.

FINE QUALITY ALUMINUM, BRASS AND BRONZE IN STRIP AND ROLLS

BRMCO

Bridgeport Rolling Mills Company
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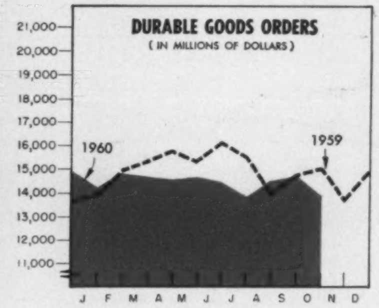
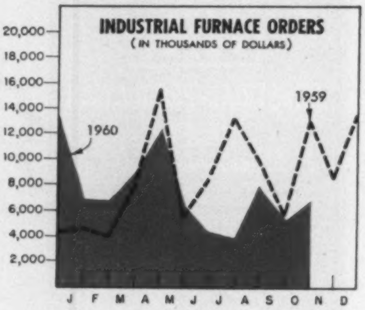


	New Orders*		Sales*	
	1960	1959	1960	1959
Jan. ..	14,190	13,900	15,450	13,541
Feb. ..	14,800	14,918	15,670	13,870
Mar. ..	14,640	15,323	15,170	14,400
Apr. ..	14,470	15,796	15,000	15,166
May ..	14,680	15,241	15,060	15,515
June ..	14,340	16,133	14,880	15,771
July ..	13,840	15,493	14,730	15,384
Aug. ..	14,410	13,974	14,420	14,008
Sept. .	14,620	14,747	14,400	14,113
Oct. ..	13,800†	15,099	14,140†	14,047
Nov. ..	.....	13,721	.....	13,479
Dec. ..	.....	14,770	.....	15,010

*Seasonally adjusted. †Preliminary.
U. S. Office of Business Economics.
Charts copyright, 1960, STEEL.



	1960	1959	1958*
Jan.	6,827	4,545	3,047
Feb.	6,784	3,596	3,684
Mar.	9,033	7,842	2,871
Apr.	12,464	15,517	3,572
May	6,352	5,315	954
June	4,340	8,230	3,672
July	3,966	13,141	5,169
Aug.	7,840	9,738	3,533
Sept.	5,253	5,560	4,846
Oct.	6,634	12,967	3,105
Nov.	....	8,442	5,597
Dec.	....	13,437	4,284

*Does not include industrial ovens.
Industrial Heating Equipment Assn. Inc.

the recession of 1957-58. They expect: 1. Consumers to prevent a major recession, largely because personal income has continued to expand despite some production cutbacks. 2. Capital expenditures by industry to decline—but not at an alarming rate. 3. A good year ahead for autos, appliances, construction, and government spending under the Kennedy administration. And they believe the inventory correction is almost over—particularly in the steel industry—and that production should equal or exceed high level consumption beginning in the second quarter.

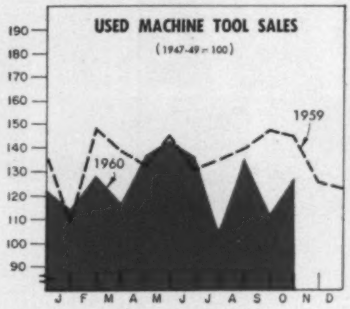
● **Matter of Degree** — Because so few of the forecasters look for a severe recession, the pessimists disagree with the optimists only in degree and timing. (Two predict the upturn will start in January; eight pick April, May, or June; only one picks it as late as September.) The delayed action group stresses the inventory situation. Except for steel, they contend that the adjustment is just getting underway and will accelerate during the next two or three months. This in turn will tend to cut spending for plant and equipment—as much as 10 per cent, claims one economist. However, the recession will still be mild compared with the last three because the government began countermeasures earlier this time. However, the less optimistic predictors maintain that emergency action by the new administration will have no real effect on the production end of the economy until late in the year.

It is encouraging to note that most of the prognosticators feel that the economy as a whole will show a somewhat better trend in 1961 than will production alone. Thus it is reasonable to assume that the gross national product will decline little if any during the first quarter and show improvement from then on.

Building News Gets Better

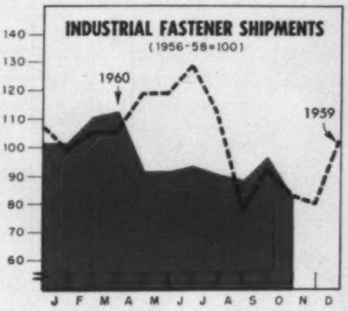
News from the construction industry continues to strengthen the contention that it will be one of the main props in the economy next year (STEEL, Dec. 5, pp. 79-80).

Construction put in place last month amounted to $4.8 billion, down only 5 per cent from the October figure. Because the usual October-November decline is 6 per cent, the seasonally adjusted rate ad-



	1960	1959	1958	1957
Jan. ...	115.0	109.5	121.1	n.a.
Feb. ...	129.3	148.1	121.9	n.a.
Mar. ...	117.8	139.3	106.3	n.a.
Apr ...	137.5	132.9	105.0	152.1
May ...	143.2	145.7	99.5	132.6
June ...	137.2	131.3	111.9	137.0
July ...	106.0	135.3	115.0	125.3
Aug. ...	135.4	139.7	93.4	115.6
Sept. ...	113.3	147.8	113.6	117.0
Oct. ...	126.9	145.2	128.8	108.9
Nov. ...	....	126.8	122.3	104.5
Dec. ...	....	123.1	135.2	87.7
Avg ...	....	135.4	114.5	128.9

n.a.=not available.
Machinery Dealers National Assn.



(Seasonally adjusted)

	1960	1959	1958*	1957*
Jan.	102	99	133	173
Feb.	111	105	117	177
Mar.	103	105	103	166
Apr.	92	119	102	157
May	92	119	111	168
June	94	129	120	162
July	91	112	133	184
Aug.	89	77	120	155
Sept.	97	92	141	159
Oct.	83	83	137	163
Nov.	...	80	134	147
Dec.	...	102	152	140
Avg	...	101	125	162

*1947-49=100.
Industrial Fasteners Institute.

vanced for the first time in several months to $55.3 billion. The November total was 2 per cent ahead of the corresponding 1959 figure, which reflected shortages caused by the steel strike.

A record level of contract awards in November assures the industry of even greater improvement in 1961. *Engineering News-Record* reports that heavy construction contracts last month totaled almost $1.8 billion, a November peak. The decline from October was held to 1 per cent, and the increase over November, 1959, zoomed to 21 per cent. Combined with the smallest 12 month increase since 1949 in construction and building costs (as reported by *EN-R*), the gain in dollar volume of contracts probably will be translated into a gain in physical volume for 1961.

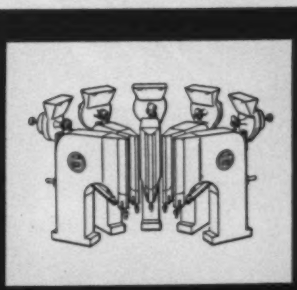
Hiring Rate: Prophetic?

The rate at which manufacturers hire new workers is often used as a leading indicator of business conditons. But examination of the historical pattern indicates it is not as reliable as the other labor indicators analyzed in this column in recent weeks (average workweek, see Nov. 28, p. 93; and the layoff rate, see Dec. 5, p. 81).

In the first place, there is less evidence on which to base conclusions. The Bureau of Labor Statistics started this series in 1951, so there is no indication as to how it might have performed in the 1948-49 recession.

In the second place, the hiring rate is not seasonally adjusted. In each year since 1951, new hires (rate per 100 employees) has advanced at some time during the first half and declined during the second half. In the ten months prior to the 1953-54 decline in the FRB industrial production index, the new hire rate dropped significantly, rose again to nearly its previous peak, then fell off concurrent with the FRB drop. Nearly the same thing happened in 1957-58. And a precipitous decline in new hires in the fall of 1955 failed to signal any recession in 1956.

Currently, the indicator seems to be entering its usual last half dip, following a moderate uptrend in the second quarter. In view of the inconclusive evidence, this barometer needs a great deal of corroborating evidence from other, more reliable leading indicators to be of much value in forecasting business trends.


NEW "BUILDING BLOCKS" for automatic riveting

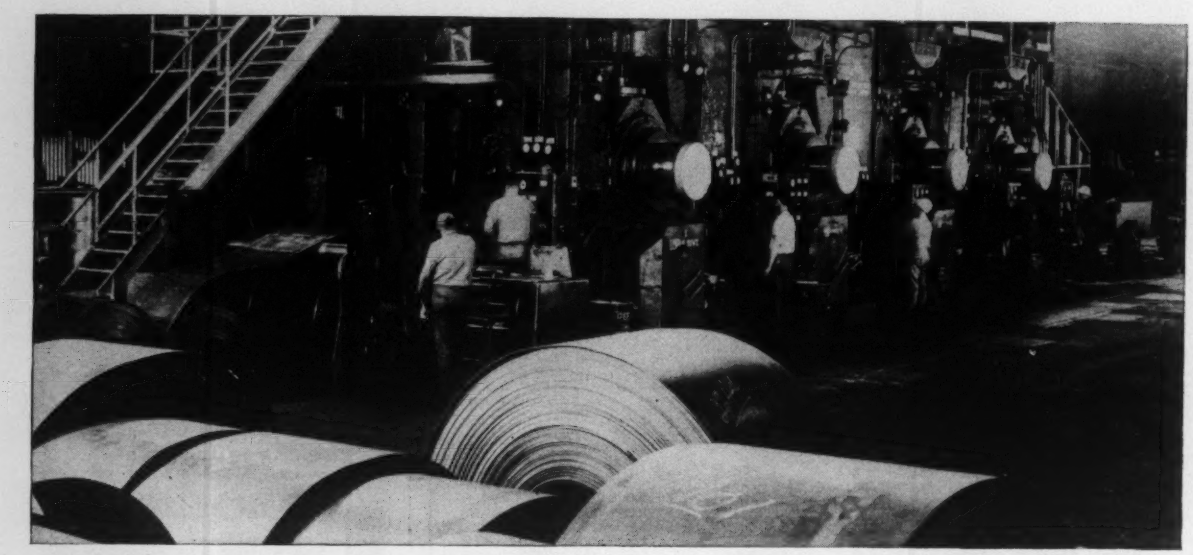
Milford's Models 56 and 57 offer unlimited flexibility in automatic assembly!

Group these new "Building Blocks" to suit your production needs. Use them singly, in pairs, in threes, fours or even fives. Write for more information on multiple riveting, the newest answer to reducing assembly costs.

For more new ideas, tips and technical data on tubular rivets and rivet-setting machines, ask your Milford Representative for a look at Milford's new MANUAL OF MODERN RIVETING PRACTICE.

THE MILFORD RIVET & MACHINE CO.

MILFORD, CONNECTICUT • HATBORO, PENNA.
ELYRIA, OHIO • AURORA, ILL. • NORWALK, CALIF.



Four stand cold strip mill of Granite City Steel Company, Illinois. One of the most powerful tandem cold reduction mills in the U.S.

Heppenstall Sleeve #1727 was in the mill 89 times . . . and rolled 921,863 tons

At Granite City Steel Company . . .

Not every sleeve can roll a record . . . regardless of who makes it. But Heppenstall and Midvale-Heppenstall Sleeves have helped raise some *averages*, too, and that's what we'd like to do for *you.*

Heppenstall and Midvale-Heppenstall Back-Up Roll Sleeves reflect the long experience of two pioneer sleeve producers. Each sleeve's working surface is *tempered to meet your exact hardness specification.*

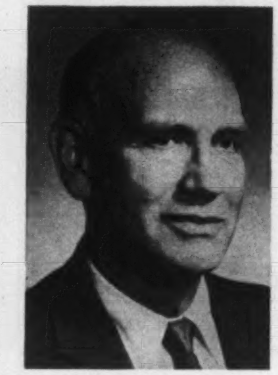
These mandrell-forged sleeves—made from highest quality alloy steel—are worked thoroughly under modern hydraulic presses to produce a finished product having both maximum density and grain refinement. They offer you exactness of fit and greater resistance to cracking and spalling during high-speed rolling.

Heppenstall and Midvale-Heppenstall also produce forged arbors . . . and have facilities to grind both arbors and sleeves for perfect shrink-fitting.

HEPPENSTALL COMPANY
PITTSBURGH 1, PENNSYLVANIA
Plants: Pittsburgh and New Brighton, Pa. • Bridgeport, Conn.

MIDVALE-HEPPENSTALL COMPANY
NICETOWN, PHILADELPHIA 40, PA.

Die Blocks • Forgings • Back-Up Roll Sleeves • Rings
Industrial Knives • Materials Handling Equipment
Pressure Vessels • Hardened and Ground Steel Rolls
Vacuum and Consumable Electrode Melted Steels



E. L. LUDVIGSEN
Eaton Mfg. adm.-v. p.

DOUGLAS L. HEISLER
Vickers purchasing dir.

WILLIAM R. BUTLER
Alcoa development mgr.

WALLACE BARNES
Associated Spring exec. v. p.

E. L. Ludvigsen was elected vice president - administrative, **Eaton Mfg. Co.**, Cleveland, with responsibility over the following operations: Effective Jan. 1, Fuller Mfg. Co., subsidiary in Kalamazoo, Mich., will be changed to **Fuller Transmission Div.**; **Unit Drop Forge**, Milwaukee, division of Fuller, to be division of Eaton; **Shuler Axle Co.**, Louisville, subsidiary of Fuller, to be an Eaton subsidiary. Mr. Fuller was president of Fuller Mfg. **Paul E. Minsel**, Eaton's vice president-industrial relations, was made general manager of Fuller Transmission Div.; **Jerome Gensler** manager of operations in Kalamazoo; and **Wayne Stone** administrative assistant to the division manager.

Elwood F. Knapp was elected vice president - manufacturing, **Firewel Co.**, Buffalo. He was plant manager.

Continental Screw Co., New Bedford, Mass., appointed **Edward Pettengill** manager of production control; **Robert L. Tripp** as purchasing agent, succeeding Mr. Pettengill.

Donald Pickles was made manufacturing and production engineering manager for **Ford Motor Co.'s** Metal Stamping Div., Dearborn, Mich. He is succeeded by **George Bernard** as manager, Material Forming & Assembly Dept.

Edward W. Backes was named director of trade relations, **United States Steel Corp.**, Pittsburgh. He succeeds **Charles T. Siebert Jr.**, retired. Mr. Backes was St. Louis sales manager.

Douglas L. Heisler was made purchasing director of **Vickers Inc.**, Detroit, division of Sperry Rand Corp. Previously corporate procurement manager of Whirlpool Corp., he had spent five years with Worthington Corp., the last year as purchasing agent, Harrison Div.

William R. Butler fills the new post of manager, Development Divisions, **Aluminum Co. of America**, Pittsburgh. Former manager of castings sales, he will direct the New Kensington, Pa., and Cleveland sales development organizations. Named to new development manager posts: **L. M. Dunn**, building products and structures; **D. P. Kennedy**, consumer durable goods; **E. T. Wanderer**, machinery and equipment; **H. H. Nuernberger**, transportation; **E. H. Spuhler**, aerospace and military; **H. W. Fritts**, containers and packaging.

Ralph A. Steude was made director of purchases of **Electric Autolite Co.'s** battery group central offices in Toledo, Ohio.

Chris E. Clausen was appointed vice president in charge of the Scale Div., Fair Lawn, N. J., of **Fairbanks, Morse & Co.** He continues as division general manager, a position he was named to last July.

Homer Foundry Corp., Coldwater, Mich., appointed **John Walker** general manager; **Robert Button** assistant general manager. Mr. Walker was plant manager of Detroit Gray Iron & Steel Foundries Inc. Mr. Button was plant manager, Ideal Furnace Co., Milan, Mich.

Wallace Barnes was elected executive vice president, **Associated Spring Corp.**, Bristol, Conn. He continues as secretary. To assume his new duties on a full time basis, he has withdrawn as partner in the Bristol law firm of Beach, Calder & Barnes.

Ivan J. Barclay and **Robert R. Cope** were made general sales managers of **Rea Magnet Wire Co. Inc.**, Ft. Wayne, Ind., division of Aluminum Co. of America. Mr. Barclay will direct sales of copper magnet wire. Mr. Cope will direct the sale of aluminum magnet wire, aluminum foil, and sheet strip conductors.

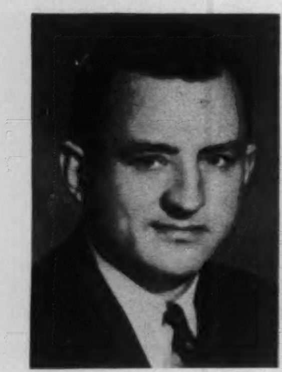
Herbert D. DeBorde was made director of manufacturing for **Burroughs Corp.**, Detroit. He continues as general manager, Control Instrument Co., Brooklyn, N. Y., subsidiary. His office is in Detroit.

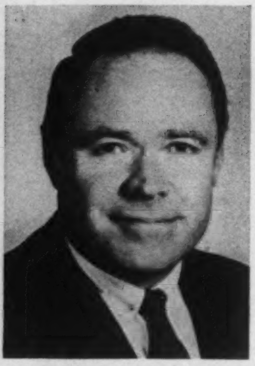
Fred A. Coenen was made director of purchases, **Chain Belt Co.**, Milwaukee, to succeed **Frederic G. Syburg**, who became vice president of international operations late last year.

Leo W. Sheehan was made Detroit district sales manager for **Bullard Co.**

Albert H. Grohol was made manager of manufacturing for **Lamson Corp.** in Syracuse, N. Y.

David H. Thomas was named president of **Rotax Inc.**, West Los Angeles, Calif. Rotax was recently formed by Mr. Thomas to manufacture small electric motors for





EDWARD H. PERKINS JR. W. O. CHAMBERLIN JR.

Brooks & Perkins executive positions

ALVAN MARKLE HAROLD P. VALENTINE

Yale & Towne appointments

tape recorders, instrumentation, computers, and associated fields.

Edward H. Perkins Jr. was named executive vice president and general manager, **Brooks & Perkins Inc.**, Detroit. He was vice president-general manager. **W. O. Chamberlin Jr.** was made director of marketing. He was director of advance planning, Cook Technological Center, Cook Electric Co.

A. I. T. Diamond Tool Co., Skokie. Ill., promoted **Leroy D. Weiss** from West Coast sales manager to assistant general sales manager.

J. R. Connell was named administrative assistant to Frank B. Rackley, president of **Jessop Steel Co.**, Washington, Pa. Mr. Connell will administer subsidiary company organization and long-range planning, and is assigned special problems in product development at Jessop and subsidiaries. He was division purchasing agent in Barberton, Ohio, for Babcock & Wilcox Co.'s Boiler Div.

Alvan Markle was made purchasing agent, **Yale Materials Handling Div.**, Philadelphia, Yale & Towne Mfg. Co. He was director of purchasing at Walworth Co.

H. C. Webb was made district sales manager, Central District (Cleveland) for **Haynes Stellite Co.**, division of Union Carbide Corp. He succeeds **F. P. Shephard,** retiring Dec. 31.

Dale S. Harris was named manager of government sales for **Gabriel Electronics Div.**, Gabriel Co., Millis, Mass. He was with General Electric Co.'s Heavy Military Electronics Dept.

Frank Mosko was made vice president-engineering contact for **David W. Murray Co.**, Cleveland. He was sales manager.

Charles A. Grim was appointed product sales manager, Cold Rolled Specialties Div., **Crucible Steel Co. of America**, Pittsburgh. He was assistant product sales manager.

Harold P. Valentine fills the new post of vice president-international, **Yale & Towne Mfg. Co.**, New York. He served for 15 years as an executive in international operations, including vice president of Mack Trucks Inc.; general sales manager of Ford Motor Co.'s International Div.; and director of marketing for Curtiss-Wright Corp.

B. J. Haley was appointed manager of the Ashtabula, Ohio, Works of **Union Carbide Metals Co.**, division of Union Carbide Corp. He succeeds **M. J. ReRoy**, retired.

James E. Wolf was made manager of aluminum sales for **Lockhart Iron & Steel Co.**, McKees Rocks, Pa. He was with the Pittsburgh district office of Olin Mathieson Chemical Corp., for whom Lockhart is aluminum distributor for the Tristate area.

Raymond K. Strayer was made sales manager, Steel Plate Div., **Posey Iron Works Inc.** He rejoins the Lancaster, Pa., firm after serving as di-

J. R. CONNELL

adm. assistant at Jessop

FRANK MOSKO

Murray vice president

CHARLES A. GRIM

Crucible product sales mgr.

RAYMOND K. STRAYER

rejoins Posey Iron

Pre-Engineering by **KAISER ENGINEERS**
answers basic plant expansion questions...

Raw Materials? Your final decision to expand or build results from a series of important individual decisions. Raw material availability is one of them. Independent analysis of all aspects of your proposed program is the *Pre-Engineering* service offered by Kaiser Engineers. In addition, KE designs and builds for the Steel industry... offers skilled experience in all types of facilities from raw material plants to finishing mills. Whatever your requirements... from Pre-Engineering analyses through plant design and construction... Kaiser Engineers brings world-wide experience and ingenuity to their solution.

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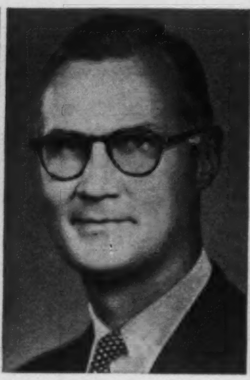
6231-S

TAD C. WROBEL
Formsprag production control



FRED L. RIGGIN JR.
Mueller Brass president

RICHARD C. WOOD
Texas Instrument post

JAMES T. HANLON
joins Sparton Southwest

JULIUS RAVEN
Enamel Products v. p.

JOHN F. MORTEN
Weston marketing services

rector of custom fabrication for Natus Corp. in Johnstown, Pa.

James T. Hanlon was made manufacturing manager, **Sparton Southwest Inc.,** Albuquerque, N. Mex., subsidiary of Sparton Corp., which will operate a new electronics facility under construction in Albuquerque. Mr. Hanlon was manufacturing manager at the Albuquerque operations of ACF Industries Inc.

John S. Slosson was elected vice president and general manager of **J. H. Williams & Co.,** Buffalo, division of **United-Greenfield Corp.,** effective Jan. 1. He succeeds **Jack C. Malugen,** who will transfer to United-Greenfield's home office in Chicago as executive vice president. Mr. Malugen succeeds **Edwin W. Zipse,** elected president of United-Greenfield.

Kaiser Steel Corp., Oakland, Calif., appointed **A. P. Farnsworth** assistant manager, tin plate sales; **B. J. Wood** assistant manager, plate, structural, and bar sales.

Julius Raven was made vice president of **Enamel Products & Plating Co.,** McKeesport, Pa. He continues as general manager of the McKeesport plant for the sister corporation of Artcraft Venetian Blind Mfg. Co. and Artcraft Awning Co.

John F. Morten fills the new post of manager-marketing services for **Weston Instuments Div.,** Newark, N. J., Daystrom Inc. He was director-product planning.

George F. Marriott was named superintendent of **Jones & Laughlin Steel Corp.'s** Stainless & Strip Div. plant at Indianapolis.

John E. Fisher was made sales engineer for **Elmwood Tool & Machine Co.,** Elmwood, Conn. He was supervisor of the research and development laboratory of Underwood Corp.

Harry T. Silverman was made chief engineer, **Sanderson - Halcomb Works,** Syracuse, N. Y., Crucible Steel Co. of America.

Tad C. Wrobel was made production control manager of **Formsprag Co.,** Detroit. He was manager of its Special Order Dept.

Fred L. Riggin Jr., executive vice president, was elected president and chief executive officer of **Mueller Brass Co.,** Port Huron, Mich. He succeeds his father who was elected to the newly created office of chairman.

Richard C. Wood was made manager, Industrial Wire Dept., Metals & Controls Div., **Texas Instruments Inc.,** at Attleboro, Mass. He was marketing manager-advanced technologies, headquartered in Dallas.

Marshall Anderson was appointed manager of manufacturing at **General Electric Co.'s** General Purpose Control Dept., Bloomington, Ill.

Clarence A. Haut was named a chief instrument engineer for **Electric Autolite Co.'s** Bay City, Mich., Div.

John K. Rye, former vice president-general manager, was elected president of **F. Jos. Lamb Co.,** Detroit. **Alfred C. Ryan** was elected chairman and treasurer.

George J. Bagnall was appointed vice president in charge of engineering and manufacturing; **William L. Gibbons** factory manager, **Lapointe Machine Tool Co.,** Hudson, Mass. **Edward M. Dowd** resigned as executive vice president.

MetroLonics Inc., Burbank, Calif., appointed **Thomas G. Utley** (vice president) to the additional post of general manager; and **Joseph S. Meyer** as vice president-marketing.

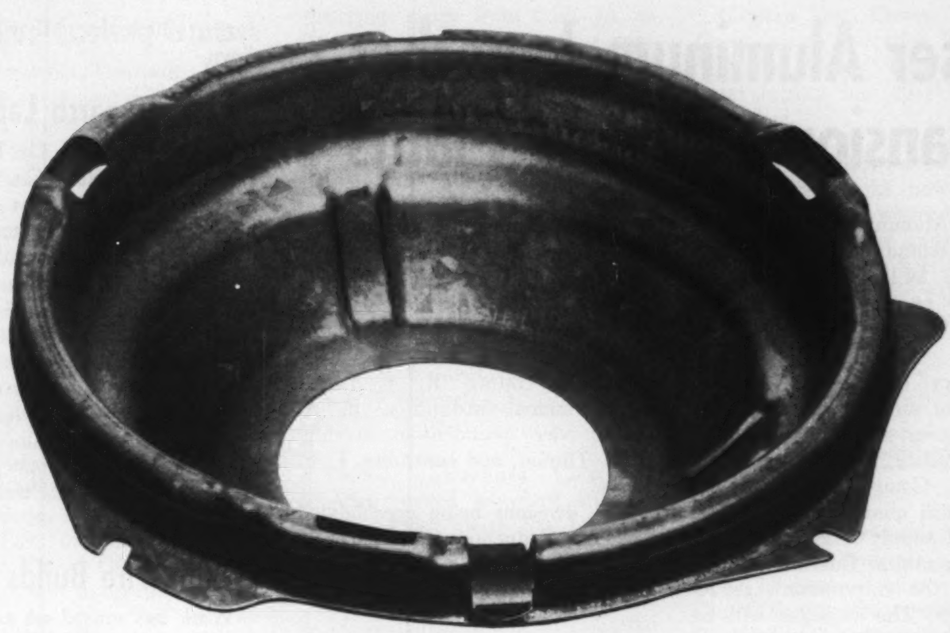
OBITUARIES . . .

Samuel Eidensohn, 49, chief project engineer, **Exide Industrial Div.,** Electric Storage Battery Co., Philadelphia, died Dec. 2.

Paul S. Menough, 76, president, **Alloy Engineering Co.,** Berea, Ohio, died Dec. 3.

George A. Goodwin, former works manager, **Master Electric Co.,** Dayton, Ohio, died Nov. 27. He served as president of American Society of Tool & Manufacturing Engineers in 1958-59.

Better products through better methods and steels



How zinc-coated steel cut 5 steps from automotive lamp housing fabrication.

When automotive head and tail lamp housings were drawn from cold rolled sheet steel and then zinc-plated or painted, as many as five or six handling and cleaning steps were required to make them corrosion-resistant.

Now, fabricated from Weirkote continuous-process zinc-coated steel, the housings go directly from the press to the assembly line. Further processing is unnecessary because Weirkote can be worked to the limits of the steel itself without chipping or flaking its corrosion-resistant zinc surface.

It's this superiority that caused the automobile industry to increase its consumption of zinc-coated steel more than 700% in five years; to use it in such varied applications as mufflers, window channels and the understructures of unitized bodies; to take advantage of developments such as differentially zinc-coated steel that can be welded at top production-line speeds.

A major supplier is Weirton Steel Company—producer of Weirkote continuous-process zinc-coated steel sheets and many other excellent steels that are improving products, methods and profits throughout industry.

Galvanized Steel

Look for the STEELMARK on the products you buy; place it on the products you sell.

WEIRTON STEEL
Weirton, West Virginia

WEIRTON STEEL COMPANY

Weirton Steel is a division of **NATIONAL STEEL CORPORATION**

Weirkote will also be available in 1961 from National's Midwest Steel Division, Portage, Indiana.

Kaiser Aluminum Launches Expansion at Three Plants

KAISER Aluminum & Chemical Corp., Oakland, Calif., has announced a $4.1 million expansion plan. The program includes three projects.

- **Gramercy (La.) Works** — Construction of an aluminum fluoride plant, costing about $1.4 million, will commence by the middle of next year. Completion is targeted for the third quarter of 1962. The plant will supply a major portion of the aluminum fluoride requirements of the corporation's reduction plants. The facilities will be erected adjacent to the alumina and caustic-chlorine plants at the Gramercy Works.

- **Chalmette (La.) Plant**—A major expansion of facilities to produce extrusion billets is underway at Kaiser's primary reduction plant. The program will increase the plant's capacity for casting high quality billets by about 50 per cent. The project is expected to be completed during 1961. Cost: About $2 million.

The project will include holding and charging furnaces, a high capacity, direct chill casting unit, and accessory equipment. The facility will be housed in a 30,000 sq ft building extension. The new equipment will be able to cast extrusion billets ranging from 3½ to 12 in. in diameter and in lengths up to 220 in. The equipment will also direct chill cast square billets for further processing into electrical conductor products.

- **Baton Rouge (La.) Alumina Works**—A $700,000 plant will be built to produce active alumina with a uniform spherical shape. It will increase Kaiser's capacity for producing active alumina by fivefold. Completion date: The second quarter of 1961.

Three Divisions United

Air Reduction Co. Inc., New York, has consolidated all its activities in the industrial chemical field into a single operating unit, Air Reduction Chemical & Carbide Co. Officers of the new division are: President, G. R. Milne; vice president-marketing, B. R. Krashin; vice president-operating, R. T. Lund; vice president-distribution, R. A. Speck; vice president-engineering, J. M. Tinnon; and controller, F. E. Evers.

The divisions being consolidated are: Air Reduction Chemical Co., Colton Chemical Co., and National Carbide Co.

Bethlehem Improves Mill

Final phase of a multimillion dollar improvement program involving the 134 in. plate mill at Bethlehem Steel Co.'s plant at Johnstown, Pa., is underway. New roller leveler (for straightening plates), cooling bed, marking machines, roller tables, and plate positioning equipment are being installed. The existing shears will be relocated. Four weeks will be required to complete the work during which the mill will be shut down.

Builds Research Lab

Rea Magnet Wire Co. Inc., a division of Aluminum Co. of America, Ft. Wayne, Ind., is constructing a research laboratory which will be ready for installation of equipment in June, 1961. Plans call for occupancy of the 26,000 sq ft facility in September, 1961. The laboratory will serve as technical center for Rea customers and house four separate research departments, a development laboratory, a pilot plant, and several supporting units, says E. Mark Wolf, technical director.

Webb Wire Builds Plant

Work has started on a 50,000 sq ft plant for Webb Wire Div., Carpenter Steel Co., at North Brunswick, N. J. The plant is scheduled for completion Apr. 1, 1961. It will house a modern wire drawing mill for the production of precision, stainless steel spring wire, needle wire, and nickel alloy, electrical, and low expansion wires. Webb Wire expects to offer a complete selection of wire coatings to the mechanical spring manufacturing industry.

EXTRUDED ALUMINUM PANEL WITH 24 CHANNELS extending its entire 65 ft length will be formed into cabinets for electronic equipment. Cool air flowing through the channels, spaced ¼ in. apart, will prevent overheating. Each channel measures (see inset) ½ x 3/16 in. Producer is Aluminum Co. of America

Ford Buys Casting Units

Ford Motor Co., Dearborn, Mich., purchased equipment for the production of automotive parts at its Sheffield, Ala., aluminum casting plant. Three, 1200 ton, diecasting machines have been ordered. A holding furnace of 3500 lb capacity and a 25 ton die for each new machine have also been ordered.

The permanent mold method and the diecasting are the two basic processes used at the plant.

Acquires Nuclear Div.

Consolidated Electrodynamics Corp., a subsidiary of Bell & Howell Co., Pasadena, Calif., acquired the Nuclear Div. of American Electronics Inc., Culver City, Calif. The new owners will integrate the business into the operations of the Analytical & Control Div. in Pasadena.

Chance Vought Renamed

Chance Vought Aircraft Inc., Dallas, will change its name to Chance Vought Corp., effective Dec. 31. The aircraft company is now in such diverse fields as electronics, astronautics, industrial automation, business data processing, mobile homes, travel trailers, missiles, and satellite tracking systems.

New Pipe Service Offered

Republic Supply Co. of California, Los Angeles, has established facilities for cutting and threading pipe to specifications. Cutting, beveling, threading, and grooving services in a wide variety are now available as well as flange makeup and production pipe bending on many stock items.

Aluminum Firm Expands

The $10 million expansion program at Fairmont Aluminum Co.'s Fairmont, W. Va., rolling mill is on schedule. New facilities are scheduled to be in operation in the spring of 1961. The expansion is designed to increase coil and sheet aluminum production nearly 150 per cent, giving the plant an annual capacity of 66 million lb of aluminum. It will permit Fairmont to increase sheet width to 72 in., the gage range from 0.125 in. to 0.006 in. The company is a subsidiary of Cerro de Pasco Corp., New York.

NEW ADDRESSES

Granite City Steel Co., Granite City, Ill., moved its Houston sales office to larger quarters at 2623 Kipling Ave., that city. John G. Quade is resident manager. The company maintains its district sales office in Dallas.

Tubular Structures Corp. of America moved its plant and offices to 4560 Sperry St., Los Angeles 39, Calif.

Jessop Steel of California moved to 14100 E. Rosecrans Ave., Santa Fe Springs, Calif.

Whitfield Chemical Co. Inc. moved its main offices and manufacturing facilities to 9100 Freeland Ave., Detroit 28, Mich. The 20,000 sq ft facility is designed primarily for the manufacture of metal cleaning chemicals. Improved laboratory and research facilities are provided.

Gardner-Denver Co., Quincy, Ill., moved its Chicago office to 2535 S. 25th Ave., Broadview, Ill. The new building has an area of 9800 sq ft.

NEW PLANTS

Texaco Canada Ltd. is building a $2 million plant at Port Credit, Ont., for the production of benzene and toluene. The plant will have an initial daily output of 1500 barrels. Xylene and ethylbenzene production will be added later.

SIPI Metals Corp., Chicago, smelter of nonferrous metals, opened a zinc oxide plant. Raw material consists of discarded diecastings and other zinc rich scrap metal. Initially, production will be scheduled at 500 tons a month.

Gabriel of Canada Ltd. opened a $500,000 plant in Toronto, Ont., that produces automotive shock absorbers.

Gaylord Div., Crown Zellerbach Corp., is now operating its plant at Weslaco, Tex. The corrugated sheet facility has 40,000 sq ft of floor area.

Nilsen Mfg. Co. moved its Phase-Shifter Div. to its new plant at Haines City, Fla., where it will produce phase shifting transducers for electronic equipment and systems. The Electronicast Div. will continue to manufacture investment castings at Addison, Ill.

ASSOCIATIONS

Chicago Foundrymen's Association elected these officers: President, J. K. Hodgson, Hodgson Foundry Co., Chicago; vice president, B. J. Chelini Jr., Troy Brass & Aluminum Foundry Inc., Chicago; secretary-treasurer, H. J. Leddy, Joliet Foundry Div., Infilco Inc., Joliet, Ill.; and executive secretary, Mildred Kosar.

Dr. I. Melville Stein, Leeds & Northrup Co., Philadelphia, was elected president of the **Foundation for Instrumentation Education & Research.** The organization is sponsored by the Instrument Society of America, Pittsburgh.

National Tool, Die & Precision Machining Association, Cleveland, appointed Jess R. Stevens as assistant executive secretary, succeeding C. R. Bender who has been promoted to the position of executive secretary.

Detroit Tooling Association (formerly Automotive Tool & Die Manufacturers Association) elected these officers: President, George Tann, Congress Tool & Die Div., Tann Corp., Detroit; vice president, H. N. Maynard, Snyder Corp., Detroit; and treasurer, W. G. Mouw, Royal Oak Tool & Machine Co., Royal Oak, Mich.

Grinding Wheel Institute, Cleveland, elected these officers: Chairman, L. A. Patt, Carborundum Co., Niagara Falls, N. Y.; president, W. G. Pinkstone, A. P. de Sanno & Son Inc., Phoenixville, Pa.; and vice president, C. F. Leitten, Electro Refractories & Abrasives Corp., Buffalo.

Specify SANDVIK

Precision-Tailored

Spring Steel

FOR ACCURATE FLATNESS, STRAIGHTNESS, WIDTH, GAUGE AND EDGE FINISH *PLUS* SPECIFIC PHYSICAL PROPERTIES

When you require specific physical properties combined with accurate dimensions in spring steel, call Sandvik.

From composition, through processing to the finished strip, Sandvik has had long experience in precision-control. That is why you find Sandvik steels used for feeler gauges, watch springs, compressor valves, camera shutters, reeds, shock absorbers and many other exacting spring steel applications.

Sandvik supplies cold rolled specialty strip steels —

- **In special analyses for specific applications.**
- **Precision-rolled thicknesses to fit your requirements.**
- **In straight carbon and alloy grades.**
- **Annealed, unannealed or hardened and tempered — scaleless or polished bright, yellow or blue.**
- **With square, round or dressed edges.**

Sandvik stocks a wide variety of qualities and sizes. In addition Sandvik has Rolling, Slitting, Edge-Filing and Hardening and Tempering facilities.

NEW, FREE BROCHURE
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SS-138

Sandvik Quality Steels

STEEL

Technical Outlook

December 12, 1960

ALUMINUM HOPE—New aluminum alloys with ultimate tensiles near 50,000 psi are promised by Yeshwant P. Telang, Applied Science Dept., Ford Scientific Laboratory, Dearborn, Mich. He explains that additions of 21 per cent silicon produce "unprecedented" mechanical properties in aluminum alloys. In addition, such alloys are said to have excellent hardness, impact, and antifriction (bearing) properties.

CLAIMS COKE COST CUT—The cost of making metallurgical grade coke has been lowered by a rotary hearth furnace, claims Ward A. Wickwire Jr., president, Salem-Brosius Inc., Carnegie, Pa.

ALUMINUM WELDS SPEEDED—A square butt technique which employs up to 600 amperes of current with argon considerably speeds joining of 1 to 2 in. aluminum plates at National Steel & Shipbuilding Co., San Diego, Calif. Radiographic tests show absence of flaws.

TICKLISH CLOSURE JOB— Joining the covers and bases of transistors and rectifiers permanently is tough—any metal vapor inside contaminates the ultrapure transistor metal. Latest method employed: Spikewelding which is said to produce leakproof joints with a smaller weld area and less heat than previous methods. Other methods in use: Cold pressure welding, cold pressure welding in a vacuum, ultrasonic welding, resistance welding.

EASY-ON PORCELAIN—The knowhow of adding direct-on porcelain enameling equipment to existing facilities was demonstrated at the annual shop forum of the Porcelain Enamel Institute, University of Illinois. Warren Co., Atlanta, says it employs both citric acid (one coat) pickling and conventional sulfuric acid side by side.

HOTTER FORGINGS—Hot dies made of a nickel-base casting alloy permit production of thin walled, precision, high strength steel forgings, says Armour Research Foundation of Illinois Institute of Technology, Chicago. Finish dimensions are said to be closer; filling improves as temperature increases. A 2 to 1 mixture of graphite and potassium iodide served as lubricant and parting agent.

METALS PRECIPITATE CHEMICAL USES—The line between chemistry and metallurgy grows dimmer. Example: About 250 lb of sulfuric acid are used to leach out the 4 lb of uranium in a ton of average ore. Other chemical products used range from inorganic acids and alkalies to gums, resins, and complex organic compounds. As quality requirements go up, chemical use is expected to increase.

IMPROVED FUEL CELL—Liquid metal is the secret of an improved fuel cell that can be 10 times smaller than its gaseous counterpart. The new device was developed by Allison Div., General Motors Corp., Indianapolis.

PHOTOSTRESS SPEEDS ENGINE DESIGN—Design changes in aluminum engine blocks for American Motors Corp. were speeded by photostress analysis, states A. F. Bauer, engineering vice president, Doehler-Jarvis Div., National Lead Co., Toledo, Ohio. He claims it is the best way to analyze diecastings to obtain lightest weight and greatest strength.

SPACE AGE BATTERIES—Sonotone Corp., Elmsford, N. Y., is concentrating on the development of new types of sintered plate, nickel-cadmium batteries for satellites and space vehicles.

HOT MACHINING BENEFITS—Cutting high strength alloys at temperatures up to 1200° F increases turning tool life up to 40 times and face milling tool life up to 100 times, states William Pentland, assistant professor, Cornell University, Ithaca, N. Y. He recommends hot machining for roughing operations where conventional cutting is difficult.

Metalworking Week—Page 35

Market Outlook—Page 107

How to Choose the Right Shielding Gas

AN INCREASING number of welding operators are finding it profitable to question, check, and often change their choice, of a shielding gas for consumable (Mig) or nonconsumable (Tig) electrode processes.

A recent survey of our records shows that such analysis and corrective action can bring benefits such as these:

1. Increased speeds.

MIG (Consumable electrode, inert gas shield)

MATERIAL	GAS	REMARKS
Aluminum Alloys	Argon	With direct current reverse polarity, removes oxide on surface.
Magnesium, Aluminum Alloys	75% Helium, 25% Argon	High heat input reduces porosity tendencies, cleans oxide surface.
Stainless Steels	Argon, plus 1% Oxygen	Oxygen eliminates undercutting when direct current reverse polarity is used.
Stainless Steels	Argon, plus 5% Oxygen	When direct current straight polarity is used, 5% oxygen improves arc stability.
Magnesium	Argon	With direct current reverse polarity, removes oxide surface.
Copper (Deoxidized)	75% Helium, 25% Argon Argon	Preferred. Good wetting and increased heat input to counteract high thermal conductivity. For light gages.
Low Alloy Steel	Argon, plus 2% Oxygen	Oxygen eliminates undercutting tendencies; also removes oxidation.
Mild Steel	Argon, plus 20% Carbon Dioxide Carbon Dioxide (Conventional)	Preferred. Both offer high speed, low cost welding, accompanied by spatter loss.
Mild Steel	Carbon Dioxide (Dip Transfer)	High quality, low current, out-of-position welding, low spatter.
Nickel, Monel, Inconel	Argon	Good wetting decreases fluidity of weld metal.
Titanium	Argon	Reduces heat affected zone, improves metal transfer.
Silicon Bronze	Argon	Reduces crack sensitivity on this hot short material.
Aluminum Bronze	Argon	Reduced penetration of base metal commonly used as a surfacing material.

By I. D. HOLSTER
Applications Engineer
Air Reduction Sales Co.,
A division of Air Reduction Co. Inc.,
New York

2. Improved quality.
3. Improved grain structures in deposits.
4. Better formation of nonmagnetic austenite in welded stainless.

• Case histories illustrate the importance of proper choice in shielding gases.

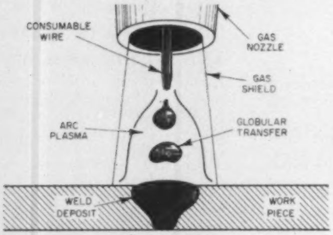
1. A New England firm used to make an aluminum container with argon shielding of a tungsten arc (operated with alternating current with superimposed high frequency). Removal of oxides was good, and a high class weld was produced. But speeds were much too low. Welding speed was increased four

TIG

(Nonconsumable electrode, inert gas shield)

MATERIAL	GAS	REMARKS
Aluminum		
(alternating current)	Argon	Preferred. Offers arc stability and good cleaning action.
	Helium plus Argon	Less stable arc than argon, good cleaning, higher speed and greater penetration than argon.
(direct current, straight polarity)	Helium	Stable arc, high welding speed on chemically clean aluminum.
Stainless Steel		
Thin Gage	Argon	Controlled penetration.
Heavy Gage	Helium	Greater penetration than argon.
Deoxidized Copper	Helium	Preferred. High head input to counteract thermal conductivity.
	75% Helium, 25% Argon	Stable arc, somewhat reduced heat input vs. helium.
Brasses	Argon	Stable arc, little fuming.
Magnesium		
(alternating current) (Direct current is rarely used)	Argon	Good cleaning action.
Low Carbon Steel	Argon	Preferred. Success depends on skill of operator.
	Helium	Helium gives greater penetration and speeds than argon. It is more difficult to handle.
Nickel		
Manual	Argon or	Easy to handle.
Automatic	Helium	Higher speeds than argon.
Monel		
Manual	Argon	Easy to handle.
Automatic	Helium	Higher speeds than argon.
Inconel		
Manual	Argon	Easy to handle.
Automatic	Helium	Higher speeds than argon.
Titanium		
Manual	Argon	Easy to handle.
Automatic	Helium	Higher speeds than argon.
Silicon Steels		
Manual	Argon	Easy to handle.
Automatic	Helium	Higher speeds than argon.
Silicon Bronze	Argon	Reduces hot short tendencies.
Aluminum Bronze	Argon	Reduces penetration of base metal. Used as a surfacing material.

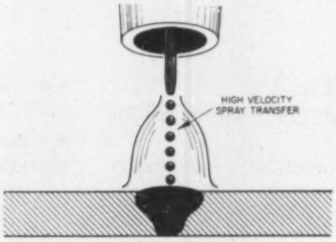
Effect of Current Density on Inert Gas Shielded Arcs (Mig)



LOW CURRENT DENSITY

POOR

The prime goal of an efficient production weld, maximum transfer of metal, is best achieved by a high current density. When current decreases, drops off the end of the electrode become large and globular; the arc is fluttering and erratic. An arc with high current density has a steady, quiet column with a well defined, incandescent cone within which metal is transferred



HIGH CURRENT DENSITY

GOOD

Consumable electrode, gas shielded processes generally employ direct current with reverse polarity (electrode is positive, work negative—DCRP). The magnetic field thus set up gives a kind of squeezing effect, compressing the molten wire to a taper. Molten metal is transferred uniformly. Particles accelerate as they approach the work, producing a "papillary" depression in the puddle. The arc column is stiff

times by caustic cleaning the parts, shielding with helium, and switching to direct current, straight polarity (DCSP).

2. Welding of low alloy steel (HY-80) for our atomic submarines was once a formidable problem. The solution came through adjusting the shielding gas mixture to 20 per cent carbon dioxide in argon. It permitted a shift to the new dip transfer (Mig) type of welding which works in all positions with lower current and voltage settings.

3. A major shipbuilder improved the quality of his Mig welds in steel plates by adding 10 per cent oxygen to the pure carbon dioxide formerly employed. Penetration increased, and the bond was flattened.

4. Armco PH 15-7 Mo stainless is used in the honeycomb for the B-70 superbomber. Light foil cores are sandwiched between sheets 0.003 to 0.010 in. thick. Welds must be made without filler wire—a factor which coarsens grain structures and reduces strength.

The solution: Up to 20 per cent nitrogen in argon or helium. That suppresses large grains, produces acceptable strength.

5. A firm had to weld stainless without making it magnetic. Results with argon and oxygen weren't acceptable. Adding only 5 per cent nitrogen to argon aided the formation of austenite and achieved an essentially nonmagnetic structure.

Those examples are typical of many which have brought substantial, often dramatic, improvements. To help you understand the basic principles, we have put together some of the general characteristics of each type of shielding gas concerned.

• There are no hard and fast rules for selecting a shielding gas or a gas mixture. Proper choice depends on a number of variables.

The main requirement of a shielding gas is to exclude atmosphere from a weld puddle and an electrode to avoid contamination of the weld deposit. Commercial equipment does the job by directing a flow of gas downward across the nozzle, electrode, and weld area. The flow has to be adequate to exclude air and counteract drafts.

Each gas and mixture has some unique property which affects welding, porosity, speed, deposition rate, and cost. For example, how do you choose between helium and argon? Chemically, there is not much difference between them—both are inert. But important electrical differences give each gas an advantage over the other in given applications.

Argon

Arcs shielded by this gas are the most stable. Used with reverse polarity (Mig), a "sputtered" effect on the workpiece aids the removal of oxides and eliminates the need for fluxes.

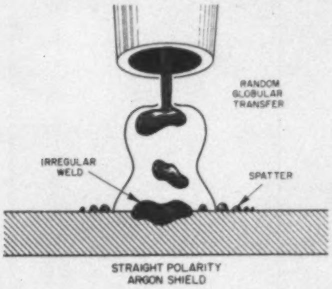
With the tungsten electrode (Tig) process, argon is better than helium for welding dissimilar metals. It minimizes the effects of inadvertent or accidental changes in arc length, so it is generally employed in most normal processing. In addition, arc starting is easier with argon when low or alternating currents are employed.

Helium

Compared with argon, helium shielding produces greater arc voltage (40 per cent) per unit of arc length, results in a hotter arc, deeper penetration, greater travel speeds, and reduces heat effects on the work.

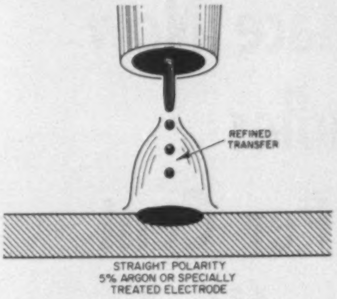
When helium is employed with Mig and reverse polarity, the cleaning action of argon is no longer present. Metal transfers from electrodes (consumable types) in larger drops and tends to spatter. Beads are broader and flatter. Penetration is much more uniform, lacking the deep central penetration of argon. For a given current and arc length, arc voltage is higher, wire burnoff greater.

With Tig, helium permits more sensitive control of automatic welding when the motion of an auto-



POOR

Straight polarity (electrode is negative, work positive) concentrates heat at electrode tip; pinch effect disappears; and huge metal globs fall to the work. Arc is exceptionally erratic, and operators will notice a lack of fusion. You can always recognize a straight polarity setup by the large globs of metal on the electrode tip where they cling until large enough to fall by gravity



GOOD

Although the burnoff rate of straight polarity is nearly double that of reverse polarity, the instability of the arc and spatter restrict its use drastically. Such inherent instability can be modified to some extent by adding oxygen to the shielding gas. Some manufacturers prefer to add an emissive agent to the wire which effects some arc refinement and smoothness of metal transfer

matic head is regulated by arc voltage. With direct current straight polarity (DCRP), helium is more stable and has a hotter arc, permitting faster welding.

With alternating current, helium gives inconsistent starting of the Tig arc. When mixed with argon properly, helium produces increased speeds and current density and greater penetration with balanced alternating current, or alternating current with continuous high frequency.

Helium is widely employed for semiautomatic and automatic welding because of its greater heat input to the work. Manual welding with this gas is difficult because of arc characteristics.

Argon-Helium

When helium is too hot or argon too cool, you can often mix them and obtain any combination of their characteristics. The arc becomes more stable as argon is added above the 20 per cent level. With a consumable electrode, metal transfers in fine droplets. A spatter tendency is still present, but it practically disappears when helium is 75 per cent of the mix. Bead contour shows a penetration pattern characteristic of both gases.

Argon-Oxygen

Oxygen additions (less than 1 per cent volume) to argon in consumable electrode (Mig) processes tend to disperse porosity characteristics in aluminum. Mechanical properties seem to be little affected. Such additions also eliminate undercutting in steels. A concentration of 5 per cent has a decided stabilizing effect on a straight polarity setting for the arc.

Argon-Hydrogen

For tungsten electrode welding, 10 to 15 per cent hydrogen can be a good substitute for helium. Although hotter than argon, it is not as hot as helium. The combination is only employed in welding stainless steels.

Carbon Dioxide

This gas is chemically active. An arc breaks it down into carbon monoxide and a relatively high percentage of oxygen which precludes its use with most materials other than mild steel.

The basic operating characteristics of CO_2, burnoff rate, and metal transfer efficiency are unaffected by additions of up to 10 per cent oxygen. Increasing amounts of oxygen have no effect on the droplet transfer rate and only brings gross porosity above certain levels, depending upon the deoxidants in the filler wire.

Nitrogen-Hydrogen

Additions of 5 per cent hydrogen to nitrogen have been used as a backup shielding gas for stainless steel. Weld root beads are brighter, apparently because the hydrogen acts as a scavenger.

- **Arcs require varying amounts of shielding gas (called flow rate).**

These factors affect flow:

1. Type of metal. Aluminum, for example, requires higher rates than stainless.
2. Joint design. Outside corner welds more readily disperse a shielding gas than an inside corner weld.
3. Welding current. The flow should increase with current rise.

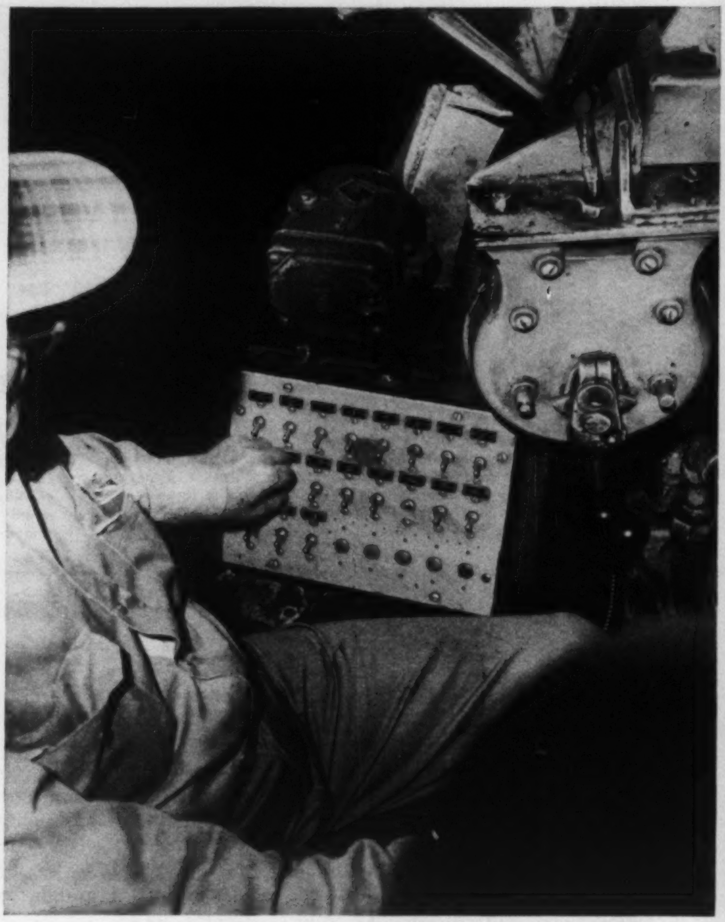
After breaking an arc in Tig welding, it's a good idea to continue gas flow to protect the tungsten electrode; otherwise, tungsten oxide will redeposit at the start of the next weld, forming undesirable inclusions. Post flow may vary from 2 to 12 seconds.

The normal speeds of manual welding usually do not affect shielding. Automatics require higher rates to prevent atmospheric contamination of the trailing edges of welds.

• If you'd like to have a copy of this article, write to Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. You may win $1000 by using material like this in STEEL. For details, see the Servicenter, Pages 5 and 6.

Inco eliminates jambs:

Furnace Now Handles 40 Per Cent More Work



Panel on furnace charger includes remote door control

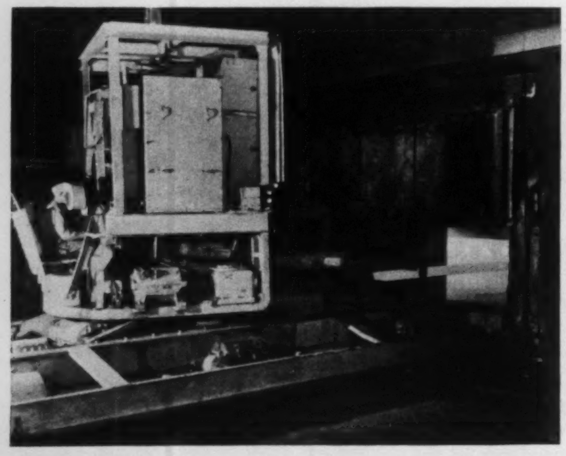
CAPACITY of a reheating furnace was boosted by eliminating door jambs at the Huntington, W. Va., plant of the Huntington Alloy Products Div. of International Nickel Co. Inc.

Other improvements: Loading and unloading were made more efficient by switching furnace door control to the charger operator; beefing up the furnace door frames with Inconel eliminated the need to replace doors every three or four weeks. Maintenance has been reduced to occasional refractory repairs.

In the previous setup, door jambs caused several problems: They were in the way of the charger operator, were often damaged, and the furnace interior couldn't be fully utilized. In addition, brick jambs and door arches required monthly repair usually covering several shifts.

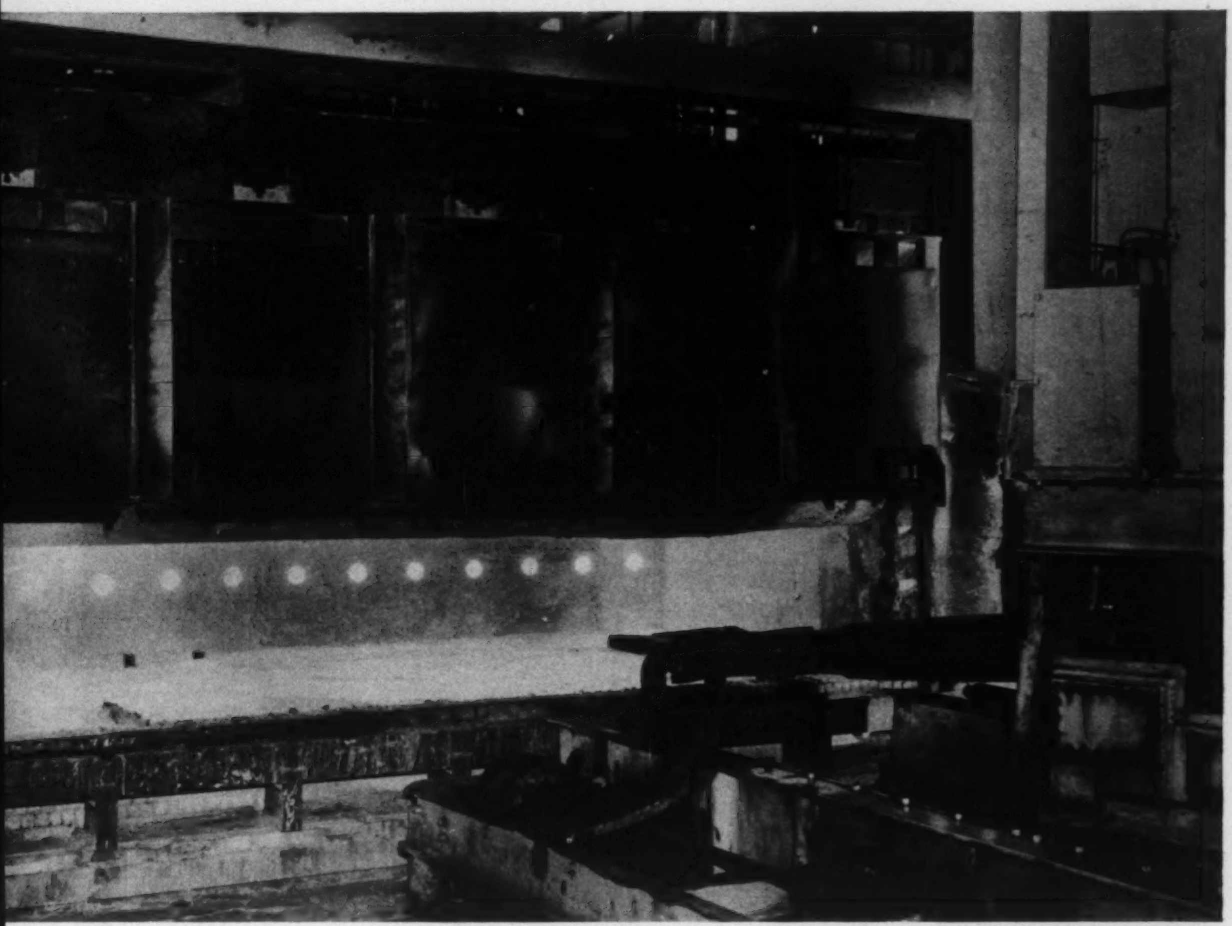
Eliminating the jambs increased the number of doors from 11 to 19 without reducing width.

The furnace (85 ft long) heats



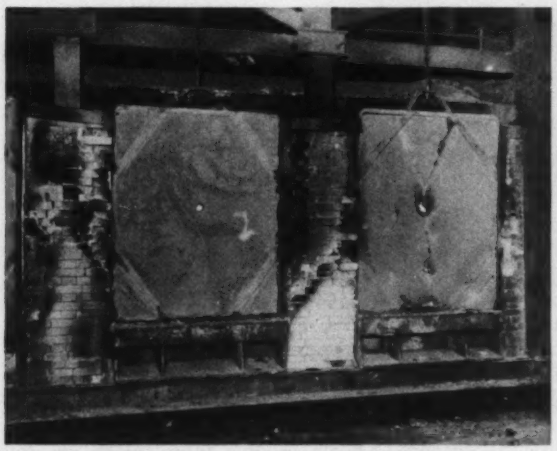
Doors overlap to provide a better seal

Bottoms of the doors fit into a sealing trough



By changing furnace design, Inco gains 40 per cent in usable hearth space

blooms that are later rolled into billets by Inco's 24 in. mill. The gas fired unit has three zones and is used at temperatures up to 2300° F. The reducing atmosphere in the furnace is maintained by partial combustion of natural gases. The roof is a flat suspended type with a rammed plastic refractory.



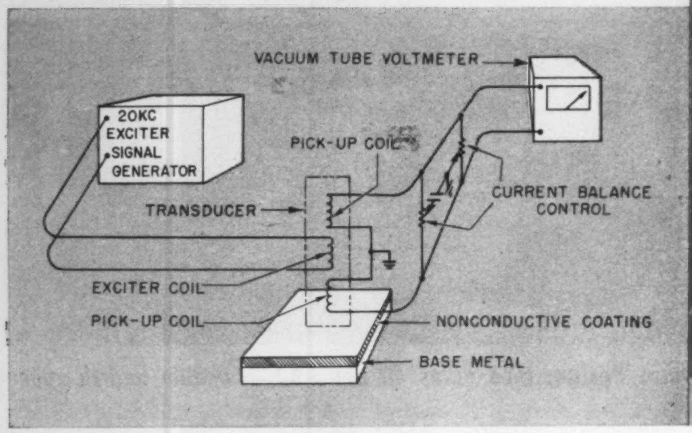
Old design used 3 ft jambs and 4 ft doors . . .

An extra man was needed to control doors

Eddy Currents Measure Coating Thickness

Tester probe works on flat or curved surfaces; meter is calibrated in inches

By PAUL DICK
Manager,
Measurements Systems Engineering,
Re-entry Vehicle Dept.,
General Electric Co.,
Philadelphia



Circuit diagram illustrates electrical principles employed in the device

A NEW test instrument we have developed uses eddy currents to measure the thickness of a nonconductive coating 0.125 in. thick on a metal surface. Accuracy is within plus or minus 5 per cent.

The device is in regular use on a line that produces a space re-entry vehicle. More conventional gaging methods, although more accurate, usually can't be employed because of the part's complex contours and obstructions. Also, sensing elements are embedded in the surface of the part.

Our production people have found that the instrument is sturdy, accurate, and will maintain its calibration for at least three months.

- **The eddy current tester is portable. It has a cabinet, a transducer, and a cable.**

The cable contains all the electrical elements which operate the transducer sensing probe. Power is supplied by standard, 115 volt current.

The sensing device is encased in nylon. It has three coils—an exciter and two differentially wound coils on either side. When the sensing device is placed on a metal base, power is absorbed from one of the coils, unbalancing the electrical system. By adjusting the device to rebalance the current in the coils, an operator may measure the distance from the coil to a metal surface quite accurately. Thickness is indicated on the dial of a vacuum tube voltmeter contained in the cabinet.

- **Nonconductive coatings are finding wider employment. Where shapes are too complex to admit ordinary mechanical gages, the new device is expected to be of great value to quality control and inspection people.**

Coatings such as ceramics, plastics, and epoxy resins are needed to protect metal surfaces from high temperatures, abrasion, or erosion, especially in space vehicles. Coatings which are too thick, add to vehicle weight; those which are too thin could be a quality problem.

CUSTOM-MADE

Stainless Strip from Allegheny Ludlum

Stainless steel strip problems are solved at Allegheny Ludlum. Excellent forming characteristics, close gauge control, special analyses, color matching, and special finishes are only a few of the plusses A-L offers to solve your problems.

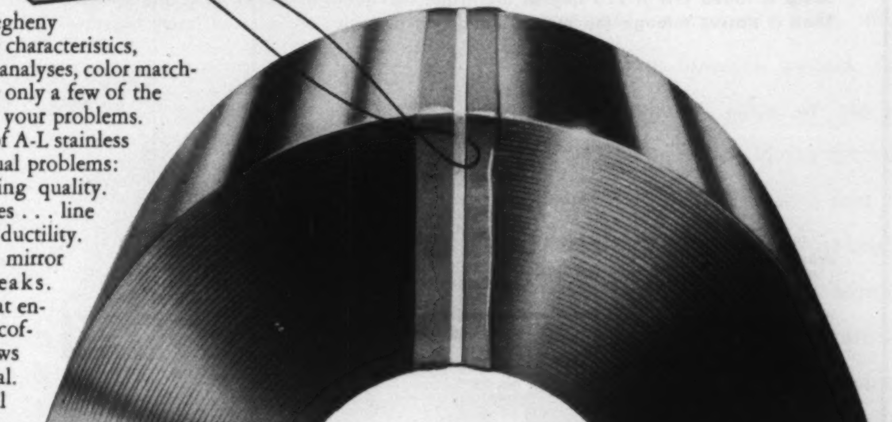
Here are some examples of A-L stainless strip made to solve individual problems:

- Type 430 with low roping quality.
- The economical 200 series . . . line free! And with increased ductility.
- Type 430 with a bright mirror finish, free of gray streaks.
- Type 302 with quality that enables a fabricator to form a coffee percolator in nine draws without an intervening anneal.

Your individual needs will get the attention you want them to have at Allegheny Ludlum. Tell your A-L representative the end use, fabrication procedures, etc., for your strip. He will work with A-L metallurgists, processing engineers, and technical men to give you the best stainless strip, custom made for your use.

Allegheny Ludlum service in stainless strip is backed up by an outstanding record for on-time delivery. Large stocks of hot bands enable A-L to give you quick service on all stainless strip needs. And A-L finished stocks give you quick, even overnight, delivery on many gauges and analyses.

For consistent temper, tolerances, and finish in stainless steel strip, call your Allegheny Ludlum salesman, or write: Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh 22, Pennsylvania. Address Department S-12-1.



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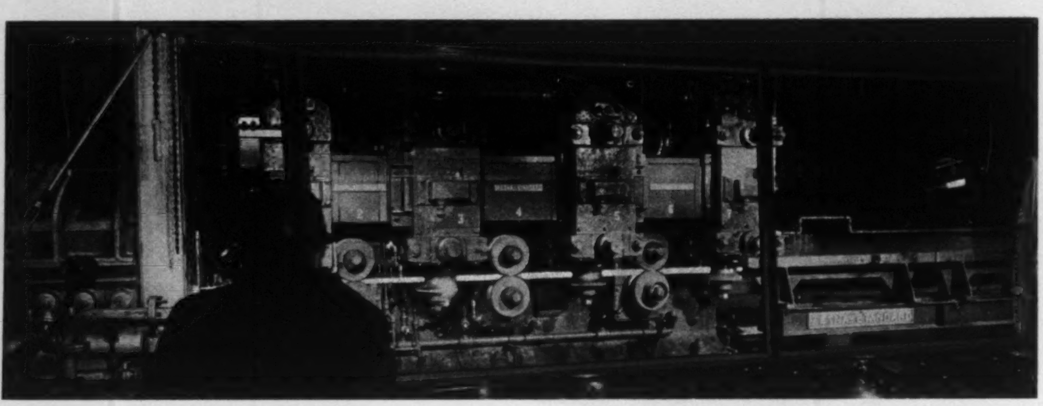
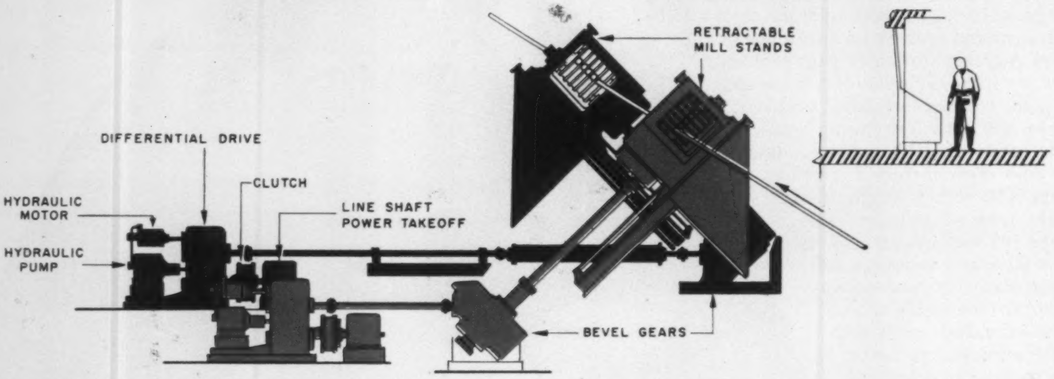
ALLEGHENY LUDLUM

EVERY FORM OF STAINLESS . . . EVERY HELP IN USING IT



Skelp is rolled into a 270 degree arc in the first stand of the forming and welding mill. Then it passes through the second stand, where edges are pressed firmly together



Two typical stands of the seven stand, stretch reducing mill illustrate components of the hydraulic, differential drive system, which insures a constant, interstand speed ratio

Continuous Buttweld Mill Modernizes Pipemaking

Forming, welding, reducing, and sizing rolls turn skelp into pipe; interstand speed ratios are kept constant by a hydraulic, differential drive system

COILED SKELP is turned into buttweld pipe at speeds of 150 to 700 ft a minute on a new, continuous mill at the Lorain (Ohio) Works of National Tube Div., United States Steel Corp.

The mill replaces furnace-and-bell welding facilities—some of which have been in use as long as 50 years.

The new facility will produce 237,000 tons of pipe annually. Diameters will range $1\frac{1}{4}$ to 4 in.

- **Successive coils are welded together electrically to permit process continuity.**

Coils of skelp from storage are loaded on the arms of a turntable that provides a continuous supply of steel to the mill. The coils are removed from the turntable, one at a time, and placed on a cradle car.

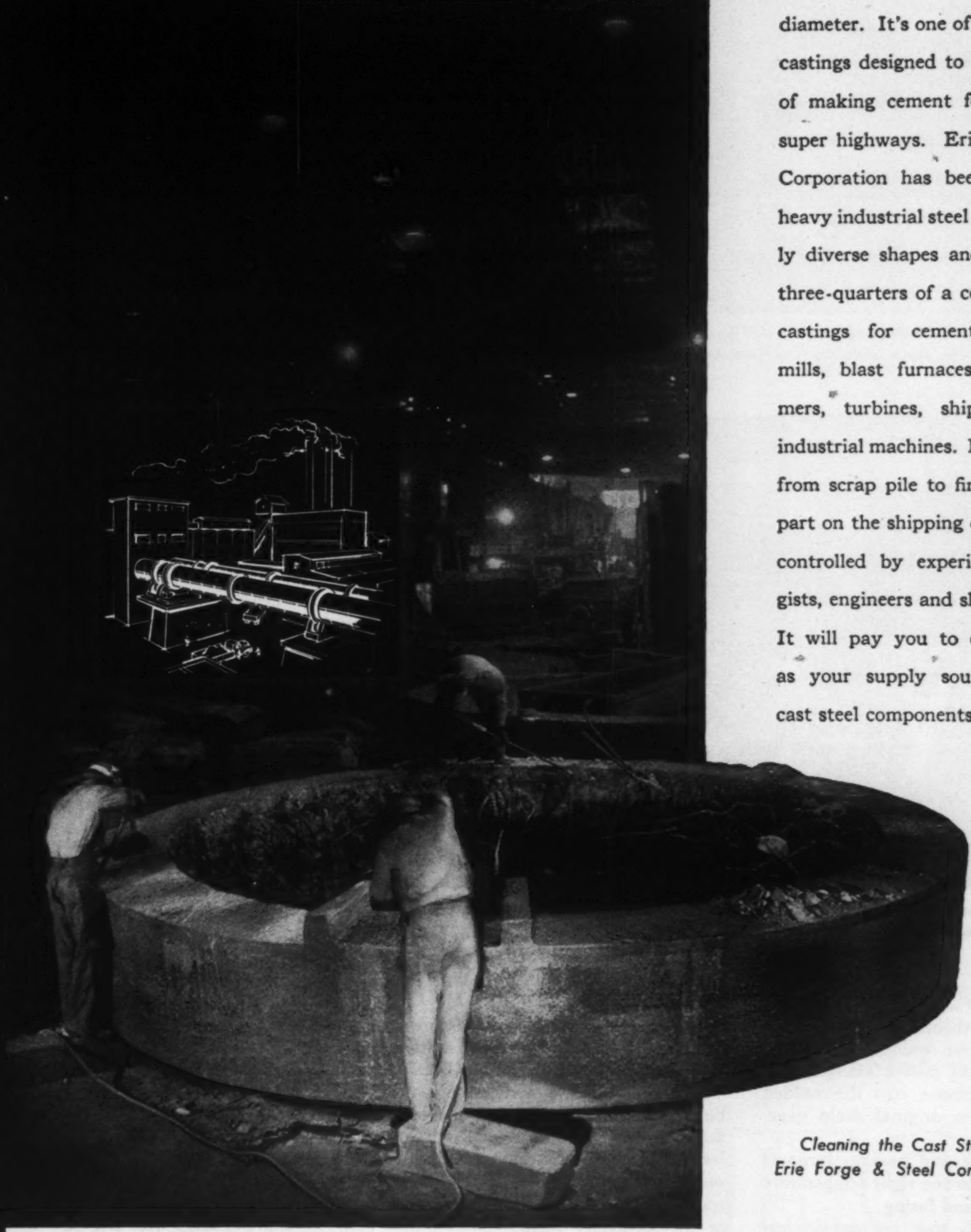
Each coil is rotated on the cradle car until it is in the right position for the coil peeler, which opens the coil and bends the skelp so it can be fed into the pinch rolls of the uncoiler-leveler. When the skelp is started through the leveler, the coil is transferred to an expanding mandrel for payoff into the mill.

An upcut shear squares the leading end of each coil and the trailing end of the coil preceding it, so the ends can be joined. A flash welding device seizes the two coil

Cast Steel Tires

That Help Build Highways–

67 tons of cast steel here!—a cement mill kiln tire 20 feet 7 inches in diameter. It's one of many such steel castings designed to bear the burden of making cement for your smooth super highways. Erie Forge & Steel Corporation has been making such heavy industrial steel castings in widely diverse shapes and sizes for over three-quarters of a century . . . steel castings for cement mills, rolling mills, blast furnaces, presses, hammers, turbines, ships at sea and industrial machines. Every operation, from scrap pile to finished cast steel part on the shipping dock, is quality-controlled by experienced metallurgists, engineers and skilled craftsmen. It will pay you to consult with us as your supply source for quality cast steel components.

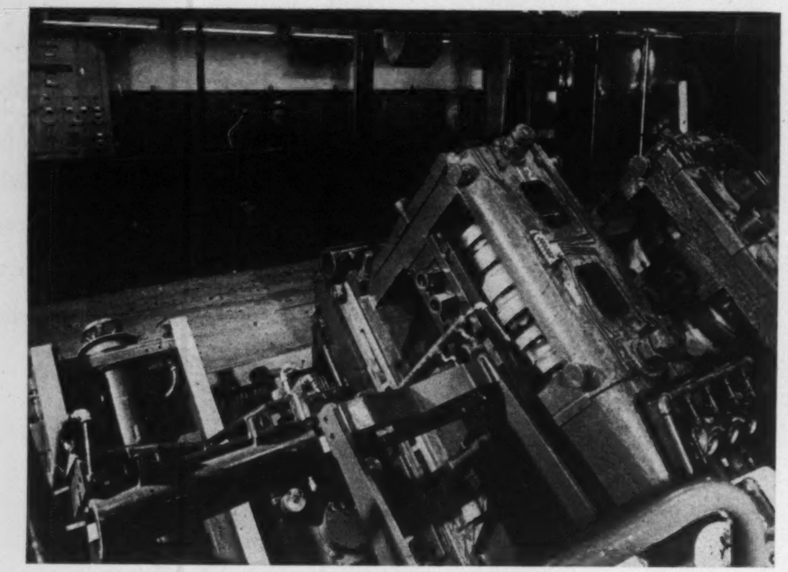


Cleaning the Cast Steel Kiln Tire in Erie Forge & Steel Corporation foundry.

ERIE FORGE & STEEL CORPORATION

ERIE, PENNSYLVANIA

Large storage loop insures continuous mill operation during end welds. Secondary loop (right) keeps skelp under constant tension as it enters the furnace



Last two stands of the stretch reducing mill are retracted. Welded pipe is passing through selected grooves in the active stands (right)

ends, heats them, and forces them together. After welding, the joint is reheated to relieve stresses, and a drawcut planer cuts the welded area down to original skelp gage.

• Preheating and heating furnaces bring skelp to the right temperature for forming and fusing.

Pinch rolls and the uncoiler-leveler push the strand of skelp away from the welder. The steel is guided to the floor and formed into a large storage loop that insures continuous mill operation while end welds are being made. Four magnet roll units help feed skelp into the storage loop.

At the end of the storage loop, a horizontal pinch roll unit moves skelp into a secondary loop, then feeds it into the preheater or upper main furnace chamber. Pinch roll speed is varied by automatic control of the secondary loop.

Skelp is normally fed through a preheat chamber that uses waste heat gases from the main furnace. Then it changes direction and makes a second pass through the preheater. Preheated skelp passes around a large sheave and into the main furnace, which is fired by 434 gas burners and divided into four heating zones. The furnace and preheater are said to be capable of heating 70 tons of 0.225 by 17½ in. skelp per hour.

• Roll forming machinery shapes the skelp and joins its edges to produce a uniform, longitudinal seam.

An air blast cleans the hot steel strip before it enters the forming, welding, and reducing stands.

Skelp passes through the forming stand, which forces it into an arc of about 270 degrees. Then it goes through a welding horn and into the welding stand, where edges are pressed firmly together. The last five stands of the welding mill provide diameter and wall reduction.

A seven stand, stretch reducing mill brings the welded pipe to its finished size. Multiple pass rolls permit rolling of six pipe sizes without changing rolls. That minimizes downtime for size changes and roll wear.

Rollshafts of the multiple pass, stretch reducing mill are 45 degrees from horizontal, and roll axes on successive stands are perpendicular. Each stand is mounted on a steel sled that houses the pinion stand; sleds are moved by hydraulic cylinders and positioned by adjustable stops. Hydraulic clamping mechanisms hold the sleds in position.

• Constant interstand speed ratios are maintained by hydraulic, differential drives.

The drive system, supplied by Beloit Iron Works, Beloit, Wis., insures compatible speeds for the last six stands of the forming and welding mill and all seven stands of the stretch reducing mill. Similar to speed control systems used in the paper industry, it permits a 30 per cent acceleration or deceleration of the line—with an accuracy of 0.1 per cent.

All forming, welding, and reducing stands are driven by a 1000 hp, direct current motor through a common lineshaft. Except for No. 1, stands receive power through differential gear units that are connected to the main lineshaft by right angle gearboxes. The differ-

FINE STEEL BY MARATHON

Call on Marathon for steel of the highest quality . . . high speed, tool, alloy, stainless and heat resistant. Available in bars, sheets, wire, castings and forgings, etc., conforming to S.A.E. and A.I.S.I. specifications, plus many other special steels to meet individual requirements. Additional information and details gladly supplied. Contact us for immediate attention to inquiries and special problems.

MARATHON

SPECIALTY STEELS, INCORPORATED

A Division of Deutsche Edelstahlwerke A. G., Krefeld, West Germany DEW 375 Park Avenue, New York 22, N. Y.

ential gearing permits variation or adjustment of stand speeds without changing the speed of the lineshaft. That is done by rotating the differential gearing independently. Rotation of the gearing in one direction increases outputshaft speed. Rotation in the opposite direction decreases the speed of the outputshaft. A hydraulic motor drives the differential gearing in the desired direction at the desired speed.

The hydraulic motors are operated by fluid from variable displacement pumps, which receive power directly from the differential input gears. Control of the hydraulic pump discharge and the direction of fluid flow between the hydraulic pump and motor permits mill rolls to run at an infinite number of speeds—30 per cent above or below the predetermined base speed.

Hydraulic tachometers automatically control and regulate a metering device that governs oil flow from the hydraulic pump to the hydraulic, differential drivemotor.

If skelp thickness varies and offgage pipe is delivered to the stretch mill, over-all elongation can be distributed automatically among the stands to bring wall thickness to its standard value.

- **Pipe is cut in lengths, sized, cooled, and delivered to inspection and finishing departments.**

A rotary, flying saw cuts the continuous pipe in predetermined lengths at maximum mill delivery speeds. Hydraulic saw drive equipment is powered by an extension of the main millshaft. An electrical signal proportional to the position of the saw blade assembly on its radial arms is fed into a summing circuit, causing the saw speed to coincide with the speed of the last active mill stand.

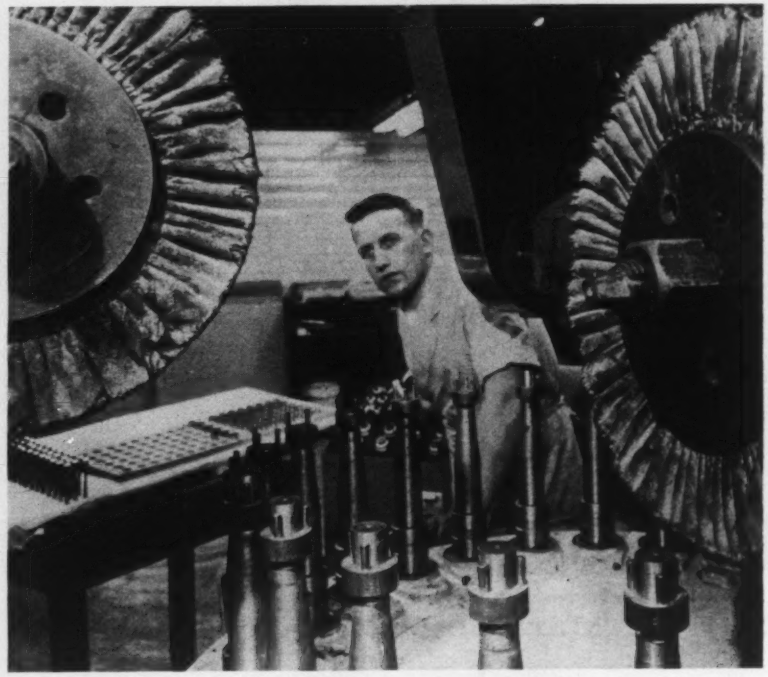
Cut lengths are reduced to the required hot size on a three stand, sizing mill, delivered by a kickout mechanism to a middle cut saw, and dropped on a cooling bed. Crop saws at opposite ends of the cooling beds trim the pipe ends.

Pipe passes from the cooling bed to a water bosh tank for fast temperature reduction. Then it is taken to conveyors that feed rotary straighteners in the finishing bay.

The pipe is then ready for finishing operations.

Maker of stainless steel weights has problem until . . .

Switch to Automatic Buffing Multiplies Output by 20



Finish on parts can be controlled by one man from panel

PROBLEM: Increase speed, efficiency, and quality of a buffing operation.

SOLUTION: An automatic buffing machine.

RESULTS: One operator turns out 20 times as much work as two men did manually. In addition, finish has greater uniformity and is of higher quality.

The automatic machine was installed at Fisher Scientific Co., Pittsburgh, which makes stainless steel weights for ultraprecise analytical balances. Buffing is regarded as perhaps the most critical operation.

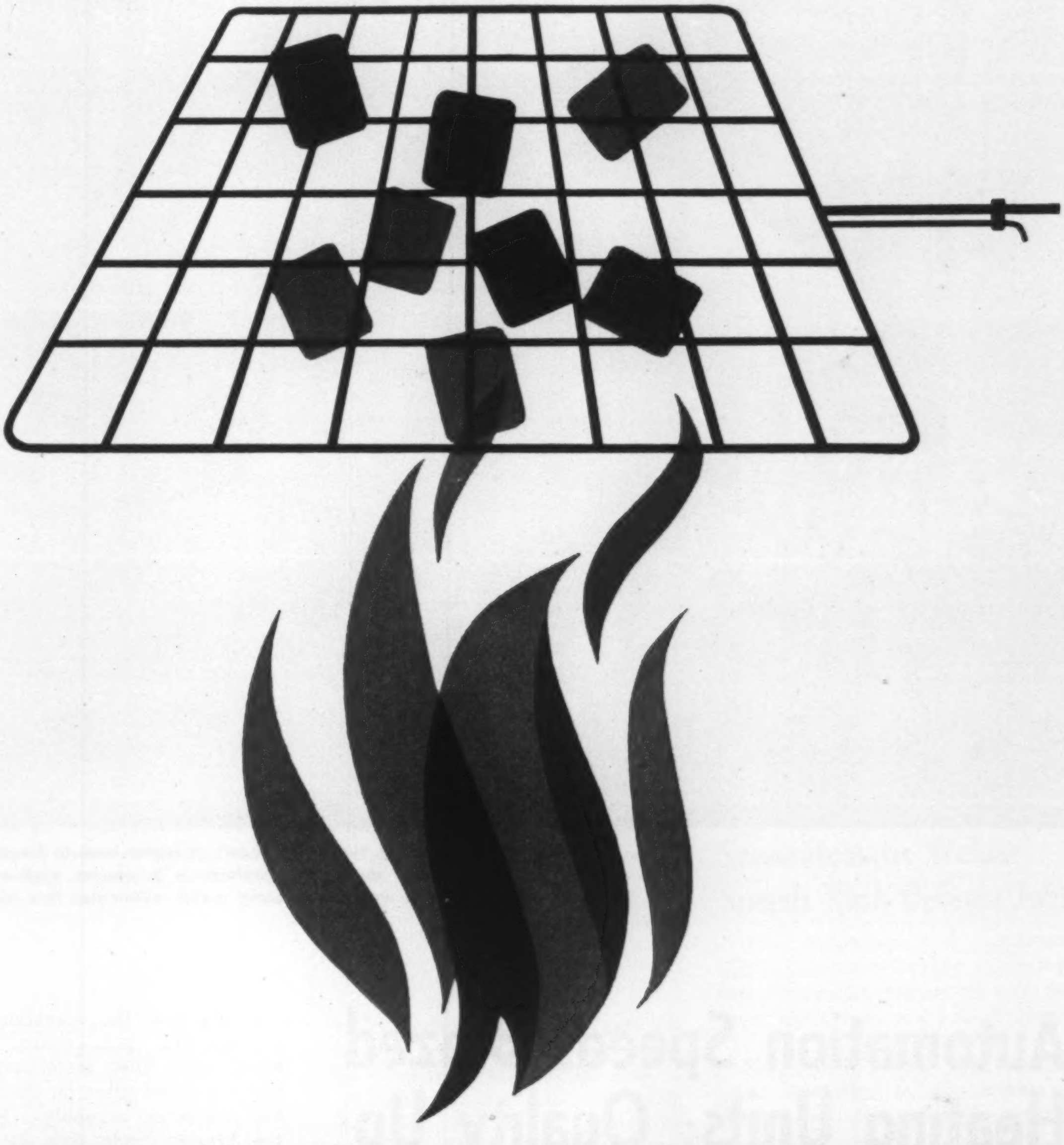
The machine has a large turntable with 24 spindles around the circumference. Weights are placed on holders on the top of each spindle. The table turns and the spindles rotate as the weights pass under successive buffing wheels and a coloring wheel. Buffing and coloring compounds are fed automatically.

At the loading station, the operator picks off the finished weight and loads a fresh one in its place while the spindles are idle.

A control panel permits adjustment of buffing pressure. Once the operator is satisfied with the finish he is getting, he needs only to check the ammeter for the motors to duplicate buffing conditions.

An unbuffed weight looks smooth but roughness and pits are shown up when the surface is magnified. Such holes collect dirt, dust, and oil from handling. That affects the accuracy of sensitive balances. Buffing the weights to a mirror brightness does much to eliminate that problem.

Permanent mass, nonmagnetic stainless alloy is employed to meet the latest group and individual weight tolerances established by the National Bureau of Standards. The buffing machine was made by Packer Machine Co., Pittsburgh.

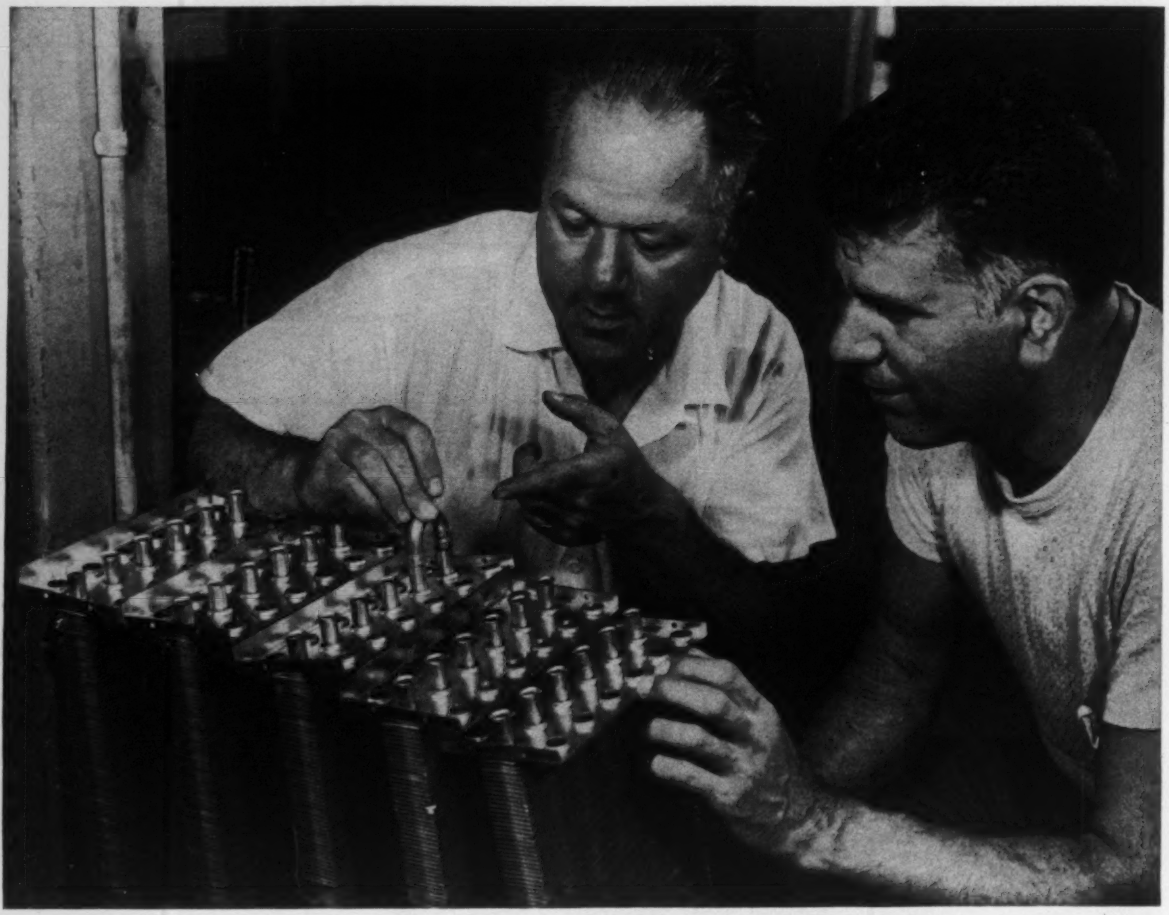


toasted nickel briquettes for low H_2 diet

Sherritt's recipe for making low-hydrogen nickel is as effective as it is simple: take pure nickel powder, press into uniform briquettes, and heat for a quarter of an hour at 1650°F. The result: pure nickel in its handiest form, with scarcely a trace of hydrogen. High-purity Sherritt nickel is also available in three standard grades of powder, special grades, and coated powders.

FOOTE MINERAL COMPANY *is the exclusive sales agent for Sherritt nickel and cobalt in the United States and Canada. For complete illustrated brochure with prices and delivery information, contact the Foote Mineral Company, 411S Eighteen West Chelten Building, Philadelphia 44, Pa.*

SHERRITT GORDON MINES LIMITED



Nesbitt production supervisor shows operator how to insert return bend in tubing so brazing preform is in correct position. Arrangement cuts waste of brazing metal, eliminates flux inclusions

Automation Speeds Brazed Heating Units; Quality Up

A SWITCH from hand to automatic brazing eliminated a bottleneck in heating element production at John J. Nesbitt Inc., Philadelphia.

In addition, production increased from 40 to 200 units a day, rejects dropped from 23 to 2 per cent, and uniformity of quality improved.

In making the elements, copper return bends are silver brazed to the ends of copper tubes in heating and cooling convectors.

- **The automatic machine (built by Selas Corp. of America, Dresher, Pa.) now employed has two work stations.**

A burner assembly shuttles between them on tracks mounted on top the machine framework. The assembly has opposed manifolds, each with burners fitted with individual gas stopcocks to regulate 750 Btu city gas.

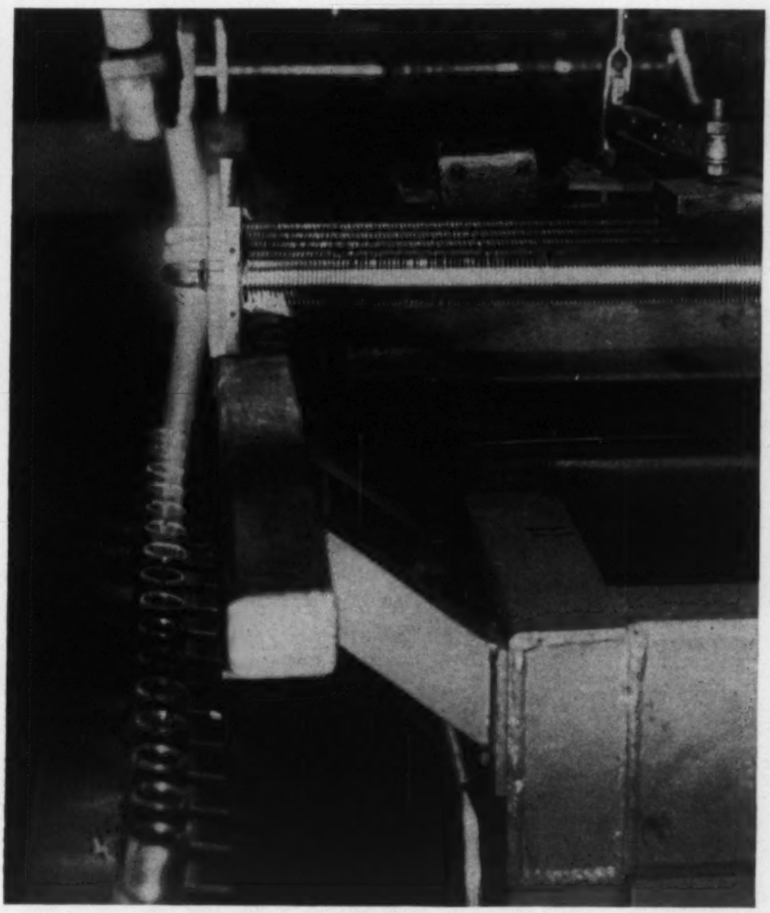
The number of burners can be varied: A crankscrew and hand lever regulate the angle of firing and distance from the workpiece.

Here's how the operation runs: An operator puts return bends, fitted with filler metal preforms, into the flared tubes on the ends of the convector assembly. He sets the brazing cycle time (it varies from 24 to 60 seconds) and loads the workpieces.

The burner assembly moves into the heating position. At the end of the cycle, the burner automatically shifts to the right hand station so the operator can alternate loading and unloading the two stations. An emergency control enables the operator to interrupt or resume automatic operation.

- **Manual operation gave inconsistent results.**

Prior to installation of the automatic brazing machine, copper return bends were first cleaned with



End view of automatic brazing machine shows position of adjustable burners during one half of brazing cycle. Second radiator is positioned at rear for next half cycle

a detergent to remove grease, then dipped in a deoxidizer to remove surface oxides and improve capillary action and flow of filler metal.

After flux was applied, return bends were positioned and the assembly placed in a supporting stand. An operator brazed the connection with a hand torch, using a high temperature silver solder. When cooled, the piece was washed to remove flux residue.

Return bends no longer need to be cleaned or deoxidized. Experience has shown that the automatic system takes full advantage of the self-fluxing action of the phosphorous bearing filler metal. It eliminates separate flux application, saves time and material, and has quieted field complaints about leaks which develop when steam dissolves flux inclusions.

- **Comparison of manual and automatic brazing shows how benefits more than offset initial costs.**

Manual brazing produced many inconsistent qualities in finished assemblies. Many steps were involved. A great deal of skill was required (a minimum of six months' training). Also, setup time was long and involved, and changeover cost was high. (More than 55 sizes and shapes are run.)

In manual operations, it was necessary for operators to apply heat evenly. In some models, as many as four tube rows congested the brazing area. Aluminum cooling fins often melted from an incorrectly directed hand torch.

Automatic brazing has eliminated such problems and enabled the Nesbitt firm to increase its gross production.

Electric Melters Ask for Standardized Ferroalloys

Ferroalloy composition and its effect on steel quality were matters of mutual interest for steel and ferroalloy producers at the Electric Furnace Conference, in Chicago. The conference was sponsored by the Electric Furnace Committee, Iron & Steel Division, Metallurgical Society, AIME.

Steel and alloy producers agree that standardization of alloy grades is desirable. Availability of several similar grades makes it difficult for the user to decide which ones he should stock, which one to use in a particular heat of steel, and how to keep the different alloys separated in storage, says one metallurgist. And chance of error is said to be increased when many grades are stocked. But the steelmaker's desire for standard grades and lower alloy prices is said to put the ferroalloy producer in a cost squeeze.

Methods of studying nonmetallic inclusions in steel, and the control of nonmetallics in castings or forgings were also discussed at the conference.

Semiautomatic Welder Speeds 'Rush' Defense Jobs

The advantages of semiautomatic, flux-cored welding are bringing substantial savings to our defense effort, reports the U. S. Naval Weapons Plant, Washington.

Example: A switch from manual stick electrodes to the semiautomatic method speeded the joining of a 1/4 in. bar to a 1/2 in. plate for a large cylinder more than seven times. In addition, the operator was able to do the job with little training.

The semiautomatic equipment is said to aid the Weapons Plant in meeting deadline defense jobs considered too "rush" for normal bid procedures. It is mounted on a dolly and carries its own power supply, control unit, welding gun and hoses, a supply of carbon dioxide shielding gas, and a cooling system. It can be employed indoors or out, claims the National Cylinder Gas Div., Chemetron Corp., Chicago.

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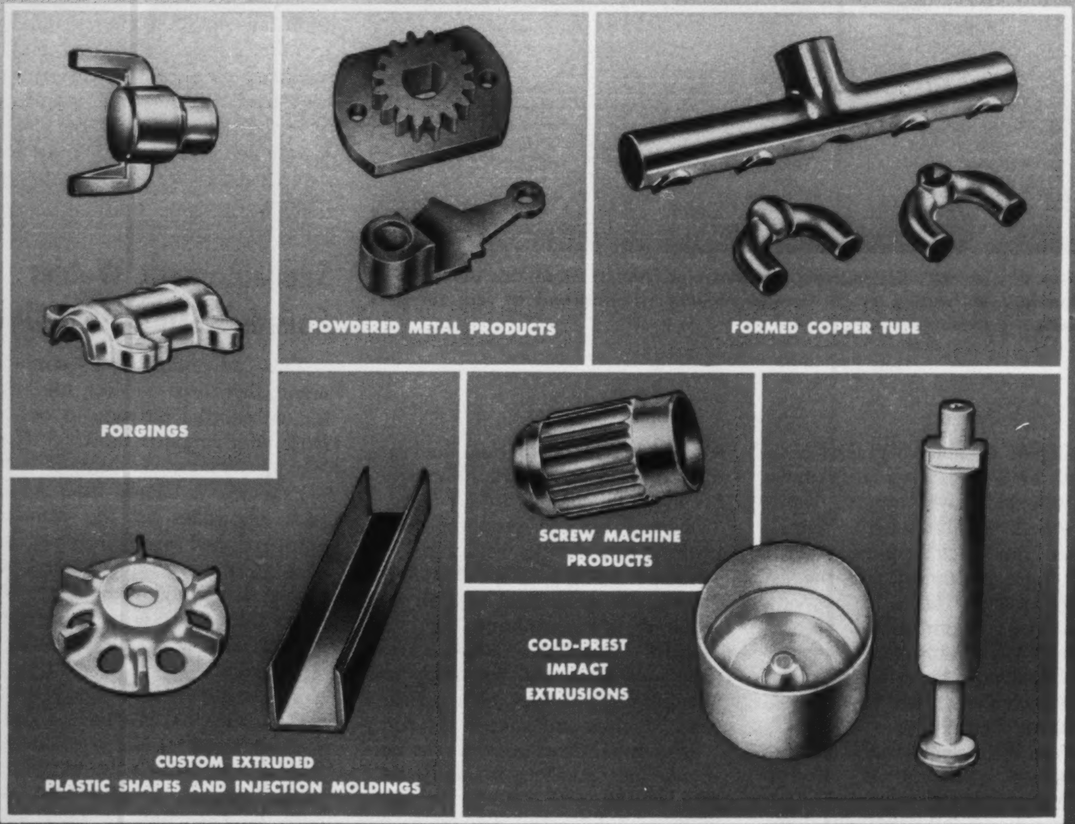
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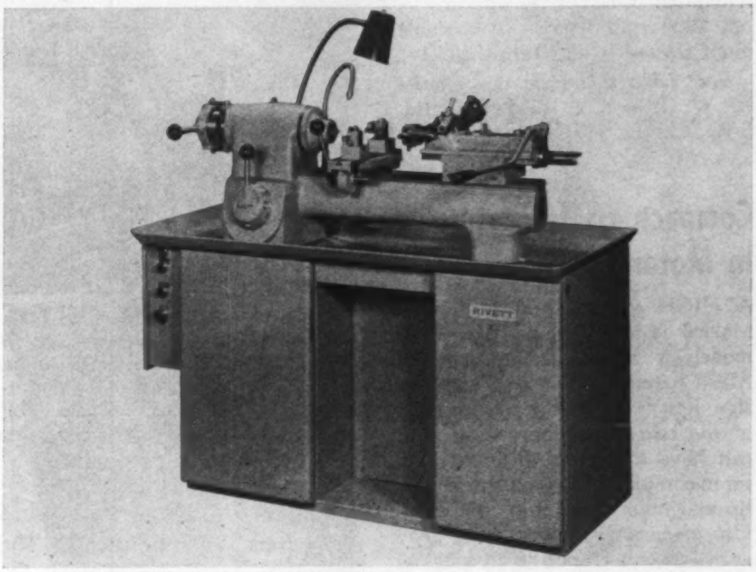
MUELLER BRASS CO., PORT HURON 26, MICHIGAN

317

Single Lever Controls Multiple Lathe Functions

"ONE MOTION control" is featured in the second new lathe in Rivett's 60 Series. A single lever starts the lathe spindle and selects any speed up to 4800 rpm. The same lever changes speed during operation or instantly stops or reverses the spindle. A pushbutton on the knob of the lever opens and closes the collet or step chuck.

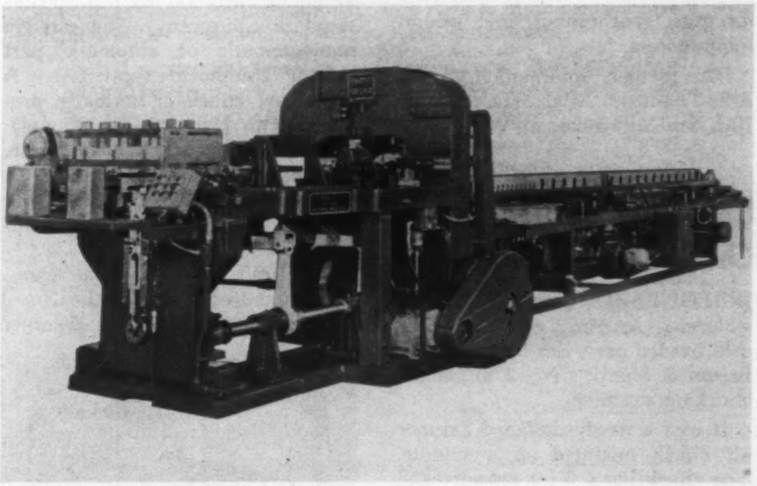


The automatic indexing turret has hardened steel slides and the head is supported by large, rigid, antifriction bearings. The turret slide passes over the top of the double tool cross slide and can be adjusted (vertically and horizontally) for accurate alignment of the turret head to the spindle.

For further information, *write* Rivett Lathe & Grinder Inc., Brighton 35, Boston, Mass.

Unit Makes Rectangular Cans in a Hurry

UP TO sixty 2 or 2½ gallon rectangular cans per minute can be produced on the Bliss bodymaking machine (Model No. 014). Design features include high output, improved gaging, an overhead clamp which positions and holds the body blank at the forming station, and smooth overhead cam drive for the forming wings.



The overhead clamp locks the can bodies in position for forming after they have been gaged by adjustable front stops. Cam operated body blank supports are also included with the unit.

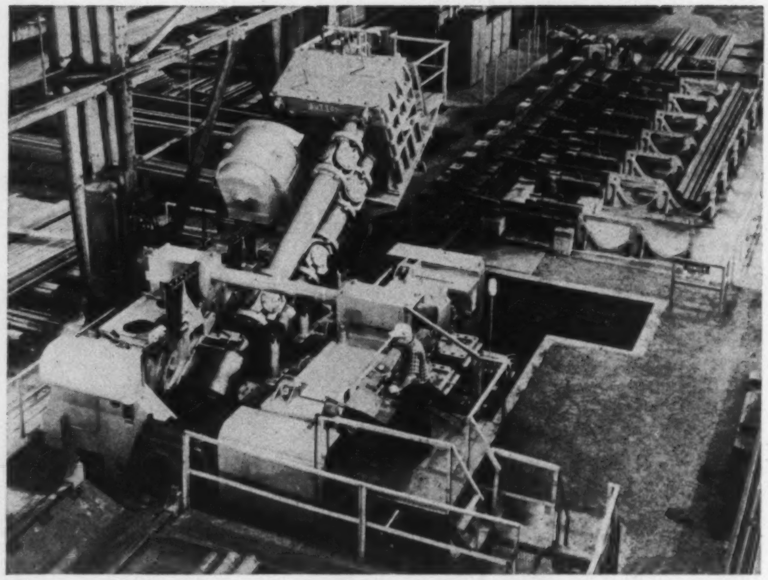
Body blanks are fed automatically from the magazine stack onto the feed bars by vacuum operated suction cups. The magazine is adjustable for all body blank sizes within the range of the machine.

Notching is done by a set of high carbon, high chrome dies and punches mounted in adjustable holders. The notching slides are crank operated and are guided by bronze V-gibs for accurate alignment.

The edger is a single station, double action unit and is equipped with hook forming steels. Each body blank is positively clamped at the edger station. A fluxing station (located before the forming station) can be provided for outside soldering.

The unit has crank operated, reciprocating, feed bars for feeding blanks and polished, chrome plated, tension pads which provide pressure on the blanks. The drive is an individual V-belt type with a $7\frac{1}{2}$ hp, 1200 rpm motor. A variable pitch sheave is also furnished.

For further information, *write* E. W. Bliss Co., 1375 Raff Rd. S.W., Canton 10, Ohio.



STRAIGHTENING HEAT TREATED, HOT ROLLED BARS from 3 to 9 in. in diameter is within the range of the precision 5BC straightener made by Sutton Engineering Co. It's installed at the Sheffield Steel Div., Houston, Armco Steel Corp. for oil country drill collar stock. The unit is part of a line of rotary straightening machines made for tubes and bars. For further information, **write** Sutton Engineering Co., First National Bank Bldg., Pittsburgh 22, Pa.

Compactness Is Featured In Motor Controller

A HIGH voltage control (Space-Maker) is half the size of previous models of the same rating made by Allis-Chalmers. The two high design has a drawout feature. Each of the two controllers in the unit can have a full rating up to 1750 hp maximum at 2300 volts or a 3000 hp maximum at 4000 to 5000 volts. Use of current limiting fuses gives each an interrupting capacity of 150 mva at 2300 volts or 250 mva at 4000 to 5000 volts.

The Space-Maker will be available (at the end of the first quarter of 1961) as a complete line with full voltage and reduced voltage, reversing and nonreversing controllers for cage, synchronous, and wound rotor motors.

For further information, *write* Allis-Chalmers Mfg. Co., 864 S. 70th St., Milwaukee 1, Wis.

Irregularly Shaped Parts Chucked on Automatic Unit

IRREGULARLY shaped parts such as forgings, castings, extrusions, and cold headed parts can be worked on Brown & Sharpe's No. 2 automatic chucking machine.

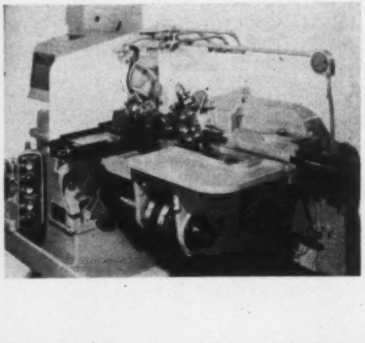
It uses a newly designed Skinner air chuck mounted on a spindle. The chuck has a 3 in. capacity and a 4 in. swing over the cross slides. Chuck jaw movement is 3/32 in. on the diameter and allows over the head chucking where required.

Gears and chains provide spindle drive from a $7\frac{1}{2}$ hp motor. The unit has 15 spindle speeds on the high range (top speed: 2095 rpm) for jobs requiring a spindle reversal during the cycle. Two higher speeds (up to 2905 rpm) are available for nonreversing applications.

Automatic and manual controls for chuck operation are furnished as standard equipment. You can get semiautomatic or automatic part loading equipment (optional). A three jaw chuck is normally provided (two jaw unit is optional). Standard equipment includes a six station turret, two cross slides (a third vertical slide is optional), and a spindle brake on neutral for loading purposes.

The unit uses the same cams, tools, and toolholders as the No. 2 automatic screw machine. A larger capacity turning tool is available for diameters between $1\frac{1}{4}$ and 4 in. Many standard automatic screw machine attachments may be applied.

For further information, *write* Brown & Sharpe Mfg. Co., Providence 1, R. I.



Aluminum Coated Strand Available in Four Grades

HOT-DIPPED, aluminum coated steel strand has been introduced by Bethlehem. The material (called Bethalume strand) comes in four grades: Common, Siemens-Martin, utilities, and high strength. Three and seven wire types are available.

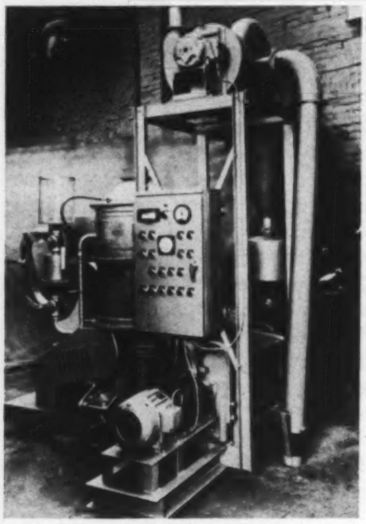
For further information, *write* Bethlehem Steel Co., Bethlehem, Pa.

Shell Sand Coater Comes Packaged, Saves Space

A PACKAGED shell sand coater saves floor space and installation time, says the manufacturer. All auxiliary and control equipment is integrated and mounted on a heavy steel bed. It's completely wired and piped and installation requires only connecting air lines and electric power to the control panel. Electrically heated air flow eliminates the need for a separate gas fired heater.

Capacity is 2 tons per 8-hour day. The timer control panel permits automatic operation. Measuring injection of the liquid resin is controlled automatically. Spillage is eliminated. The pneumatically operated bucket loader is automatically controlled and operated from the control panel.

An automatic, pneumatically operated, toggle action, discharge door permits discharge of the hot coated sand directly onto the vibrating screen. A sand cooling system rapidly lowers sand temperature and conveys and elevates the material to storage and hopper level.



For further information, *write* Shalco Div., National Acme Co., 170 E. 131st St., Cleveland 8, Ohio.

Unit Lifts, Positions, Dumps 55 Gallon Drums

LIFTING AND positioning 55 gallon drums for dumping is accomplished easily by an automatically controlled unit designed by Colson. It comes in 500 and 1000 lb capacities and can raise a load up to 12 ft before dumping. Standard dumping height for the unit is 6 ft.

Raising and lowering is controlled from constant pressure pushbuttons. Up and down speed for a 500 lb

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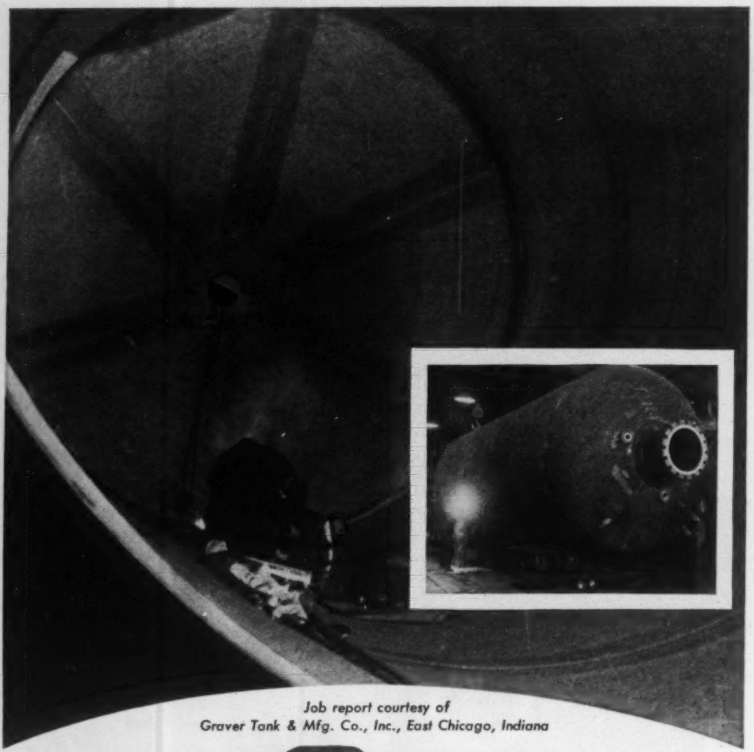
When stainless welds must be free of microcracks

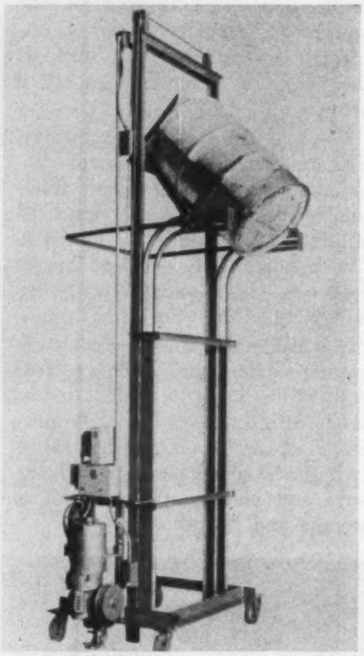


Job report courtesy of
Graver Tank & Mfg. Co., Inc., East Chicago, Indiana

WELD WITH ARCOS

STAINLESS ELECTRODES

This 93,400-lb. 3500 cu. ft. digester is installed at Finch, Pruyn and Company, Inc., manufacturers of printing and converting papers. It converts hardwood into paper pulp using highly corrosive acids at high temperatures, and pressures of 200 psig. The digester is made of Type 316 ELC 20% stainless clad on ASTM A-212 Grade B firebox steel. To assure sound, long-life corrosion-resistant welds, three grades of Arcos CHROMEND Electrodes were used. All welding was manual. The resultant welds were completely free of micro fissures or cracks—more proof why Arcos weld metal is used so widely to combat destructive and costly corrosion. Write for an Arcos Stainless Application Chart. ARCOS CORPORATION, 1500 South 50th Street, Phila. 43, Pa.



load is 20 ft per minute; 10 fpm for a 1000 lb load.

Safety features include machine stop upon button release, limit switches at top and bottom of the unit, and a cable drum safety guard. It's available as a portable or stationary unit. Optional equipment includes momentary contact pushbutton controls with automatic cycling and a choice of motor voltages.

For further information, *write* Colson Corp., 7 S. Dearborn, Chicago, Ill.

Color Coded Relay Kit Makes Fast Conversions

A SYSTEM of 30, color coded, relay conversion kits is tied in with an information chart. With the color diagrams on the chart, users can easily modify standard types of relays in the Clark PM line to meet virtually any switching circuit control requirement.

One application: In emergencies you can replace an existing relay in a hurry by modifying a standard relay to fit the job.

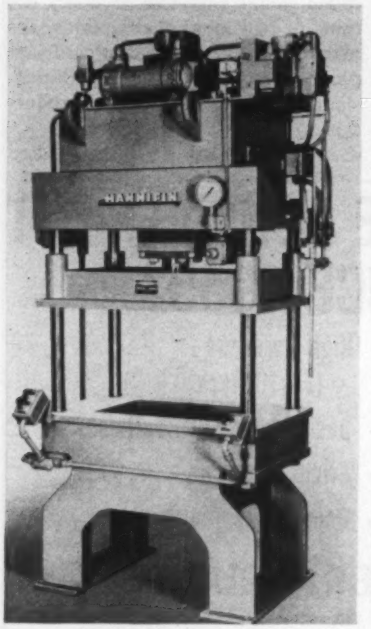
For further information, *write* Clark Controller Co., 1146 E. 152nd St., Cleveland 10, Ohio.

High Speed Advance Cited By Trimming Press Maker

HIGH SPEED advance to 1300 ipm is a feature of a 30 ton, four column, hydraulic, trimming press for large dies. Ram speed may be reduced to 240 ipm at the casting contact so trimming can be done by a soft shearing action. Result: A cleaner, more accurate casting trim, reducing the danger of damage to dies, and minimizing rejects, says the maker.

The press is compact and can be placed in areas near casting machines, eliminating transportation and stacking damage to warm castings.

The unit has a 240 ipm feed, 790 ipm return, 2120 maximum working pressure, 20 hp motor, 31 gpm pump, and a 29 x 42 in. base. Other models in the T4C Series have working capacities from 10 to 150 tons.

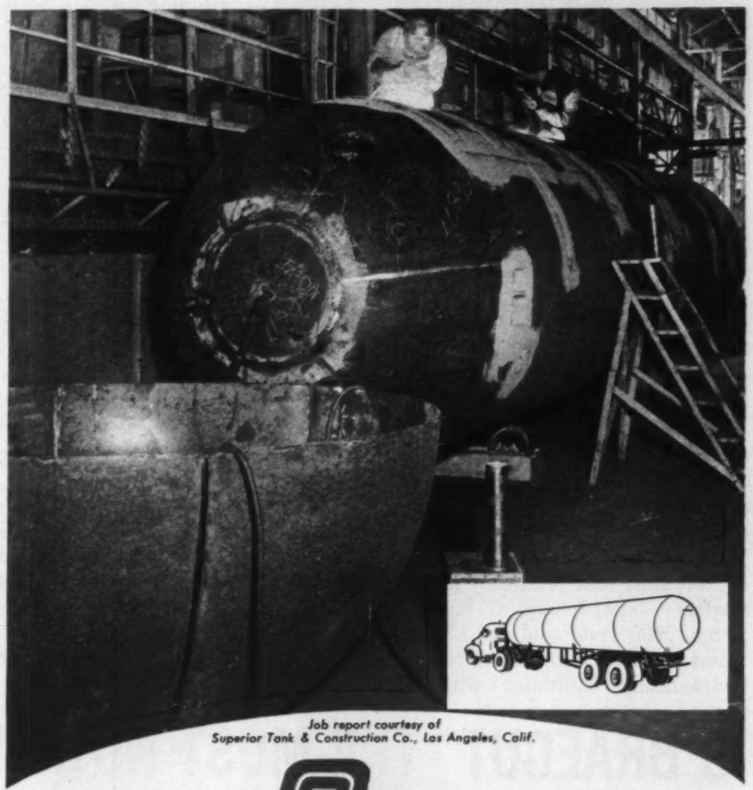


For further information, *write* Dept. 124, Hannifin Co., Des Plaines, Ill.

Unit Developed to Grind Die Rings

OUTSIDE diameters, inside diameters, and surfaces of large die rings can be handled by a special grinder

How X-Ray Quality Welds Make Low Alloy Steels Pay Off

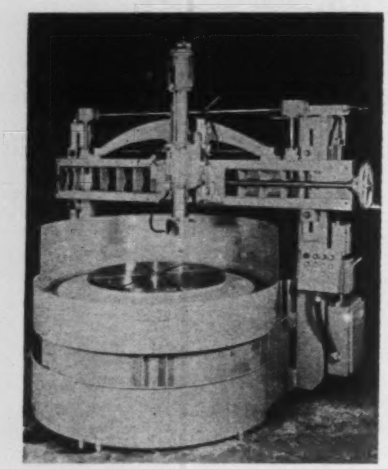


Job report courtesy of Superior Tank & Construction Co., Los Angeles, Calif.

WELD WITH ARCOS

LOW HYDROGEN ELECTRODES

The vessel being welded is part of an L.P.G. tank truck. For high strength with low weight—USS "T-1" steel is used and welded with Arcos Ductilend 110 Electrodes. These tanks meet or exceed ASME code requirements . . . and all Ductilend 110 welds qualify with X-ray soundness. Ductilend 110 is an Arcos Low Hydrogen Electrode especially developed for welding high strength notch tough steels of the 110,000 psi tensile strength range. Data sheet on request. ARCOS CORPORATION • 1500 South 50th Street, Philadelphia 43, Pa.



developed by International Tool Co. The unit shown is designed to handle hardened and ground rings from 40 to 80 in. in diameter.

The unit is capable of automatic reciprocating feed (vertically and on angles). The spindle is rated at 3 hp, 3600 rpm, and for a 7 in. wheel diameter (maximum). It's hydraulically controlled with infinitely variable feed from 0 to 18 in. per minute and a stroke from 0 to 9 in.

The table is 42 in. in diameter and has an infinitely variable speed from 2¼ to 4½ rpm (5 hp). Maximum swing is 83 in.

For further information, *write* International Tool Co., Dayton, Ohio.

Adjustable Spindles Make Machines More Flexible

ADJUSTABLE, inverted, countersinking spindles greatly increase the flexibility of Bodine dial type machines, says the maker. The new spindles are adjusted in the same way as a cutting tool in a lathe tool post. Depth of cut is set by micrometer adjusting screw.

The spindle can reach any position of the indexing dial. The ease of adjustment is expected to aid plants with relatively small runs of stamping requiring secondary operations such as drilling, reaming, tapping, and chamfering operations on both sides of the work.

For further information, *write* Bodine Corp., 317 Mountain Grove St., Bridgeport 5, Conn.

Ferrous, Nonferrous Strip Accurate to 0.0001 in.

STRIP (ferrous and nonferrous) in tolerances of 0.0001 in. is now available in commercial qualities. The maker says the accuracy of the rolled metal (as close as ±0.5 per cent of thickness) eliminates the need for precision grinding and lapping operations, minimizes dimensional rejects, and speeds production.

In strip gages, it can be used

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- High Hardness (To 70 Rockwell C)
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- Grinds Easily
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* Patent Pending

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"Outstanding"—"Phenomenal"—"Amazing"—are adjectives applied to BRAECUT by tool engineers who have tried this new high speed steel. Designed for High Temperature Alloys and high strength steels, its performance ranks with the most significant advances in the science of metal cutting.

You will be interested in testing BRAECUT if you have appropriate applications. No special grinding equipment is needed. Write, wire or phone your nearest Braeburn sales office to arrange for a BRAECUT test. Available in standard tool bit sizes.

• Studies now being conducted in the following applications: Broaching, Reaming, Milling, Tapping, Hobbing, and Drilling.

Braecut Bulletin #61A on Request

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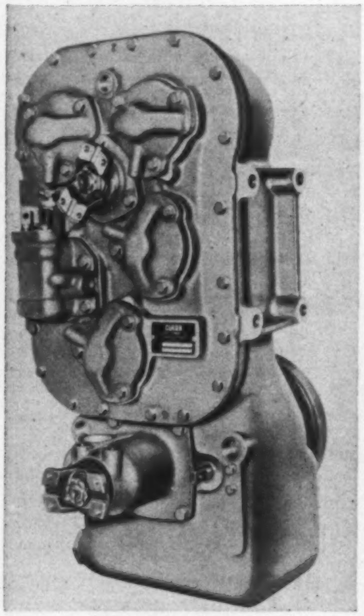
where precision parts are stamped or formed from strip. In shim gages, it can provide precision tolerances when used with forgings or castings previously machined only to commercial tolerances. It's available in thicknesses from 0.0005 to 0.125 in.; widths up to 6 in.

For further information, *write* Industrial Div., American Silver Co., Flushing, N. Y.

Transmission Suited for Lift Trucks and Loaders

A TRANSMISSION designated the 2000 Series is suitable for jobs in units such as front end loaders, rollers, and lift trucks. It's designed for use with the Clark 270 Series torque converter and can handle gasoline or diesel engines of about 200 ft-lb of torque output.



It uses a system of four hydraulic clutches to provide two speeds forward and in reverse that are power shifted. A manual range selector is set up for four speeds in each direction. Reduction ratios are 4.78 and 2.53 in the two lower gears and 1.31 and 0.69 in the higher gears.

For further information, *write* Automotive Div., Clark Equipment Co., Jackson, Mich.

THE WORLD'S MOST MODERN GRAVITY DROP HAMMER--

The IMPROVED CECO-DROP

with CECO BLOWMATIC PROGRAM CONTROLLER
(illustrated below)
Pre-selected pattern of long and short strokes for Semi-automatic Forging

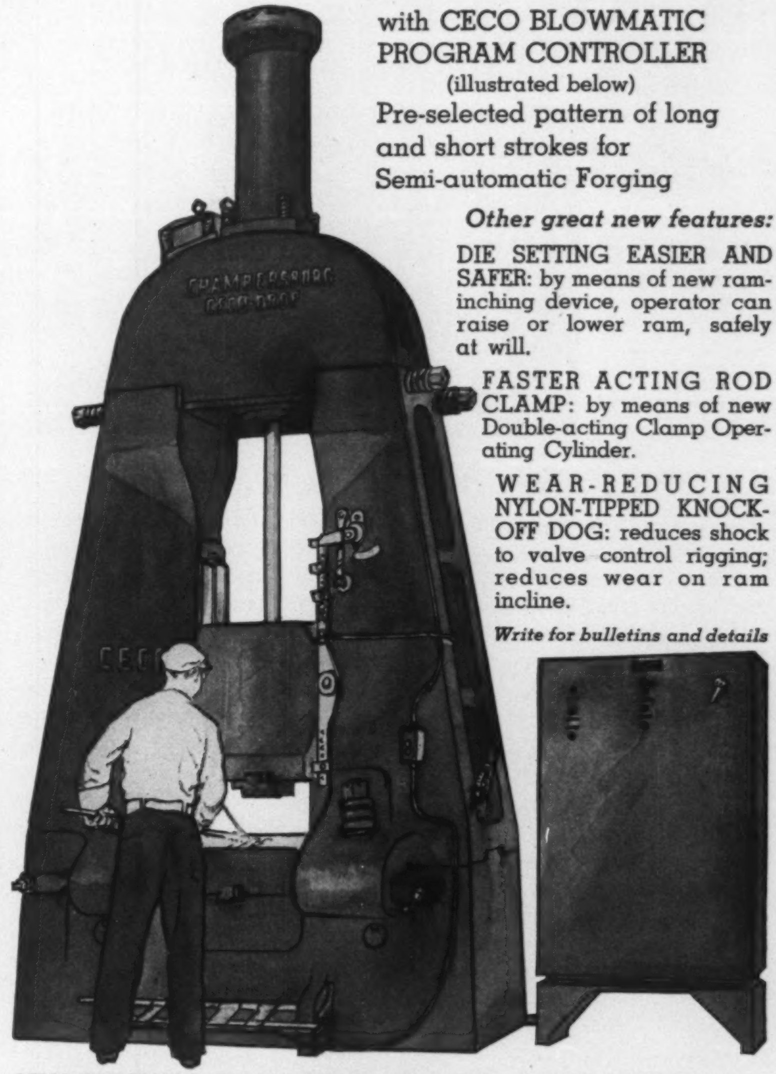
Other great new features:

DIE SETTING EASIER AND SAFER: by means of new ram-inching device, operator can raise or lower ram, safely at will.

FASTER ACTING ROD CLAMP: by means of new Double-acting Clamp Operating Cylinder.

WEAR-REDUCING NYLON-TIPPED KNOCK-OFF DOG: reduces shock to valve control rigging; reduces wear on ram incline.

Write for bulletins and details



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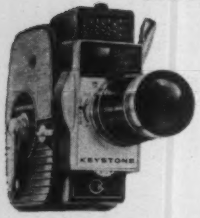
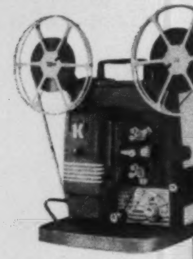
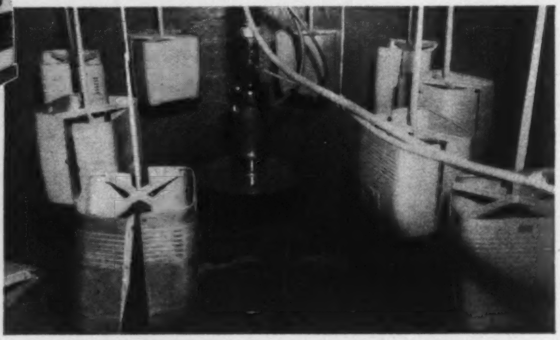
When it's a vital part, design it to be FORGED



KEYSTONE CAMERA
Relies on
RANSBURG
No. 2 Process
Electrostatic Spray Painting



to get the high quality wrinkle finish on cameras and projectors



Projector covers rotate as the conveyor makes a loop around the ceiling-mounted Ransburg No. 2 Process reciprocating disk. Electro-Spray is providing large paint savings on this wrinkle application, and permits Keystone to meet increased production requirements.

Keystone Camera Company, Inc. adheres to a strict quality control program—from start to finish—in the production of their widely-distributed, high quality home movie products. That's one reason for using the Ransburg No. 2 Process to apply a uniform wrinkle finish on their cameras and projectors.

IMPROVED QUALITY AND LARGE PAINT SAVINGS TOO

Together with the improved quality and greater uniformity in their finish, Keystone reports large paint savings over former air hand spray. Rejects which used to run 7%, or more, are reduced to less than 1%. Too, Ransburg No. 2 Process has enabled their finishing department—often a bottleneck in production—to meet steadily increasing production requirements without resorting to expensive overtime. Now, with the automatic No. 2 Process, they can turn out more projector covers in an hour than one operator formerly painted in a day. And, assembled cameras are painted five times faster with Electro-Spray. As a result of these desirable advantages—coupled with even higher production schedules—another Ransburg No. 2 Process unit was authorized for a second, identical production line at Keystone.

NO REASON WHY YOU CAN'T DO IT, TOO

Let us show you how Ransburg No. 2 Process can improve the quality of YOUR painted products, and at the same time, cut YOUR paint and labor costs. Send for our No. 2 Process brochure. Or, if your production doesn't justify automatic painting, let us tell you about the No. 2 Process Electrostatic Hand Gun which can be used in either conveyorized or non-conveyorized painting.

RANSBURG

RANSBURG Electro-Coating Corp.
Box 23122, Indianapolis 23, Indiana

NEW Literature

Write directly to the company for a copy

Coatings Characteristics

Compositions and physical constants for flame plated coatings are covered in a series of bulletins. Linde Co., a division of Union Carbide Corp., 270 Park Ave., New York 17, N. Y.

Graphite and Carbon Felts

Information on eight grades of plain and reinforced graphite and carbon felts is given in Bulletin 104. National Carbon Co., a division of Union Carbide Corp., 270 Park Ave., New York 17, N. Y.

Condenser Tube Handbook

Information on the corrosion ratings of various condenser tube materials is offered in ten pages of tables. Handbook D-10 also features information on the welding installation of tubes and updating of specifications (ASTM B-111) and estimating data for maximum lot weights. Chase Brass & Copper Co. Inc., Waterbury 20, Conn.

Ternalloy Data

Detailed specifications for the Ternalloy series of aluminum alloys are given in an eight page brochure. Apex Smelting Co., 2537 W. Taylor St., Chicago 12, Ill.

Adhesives Selection

Bulletin No. 701 discusses the selection of adhesives, bonding techniques, and testing methods, and provides a glossary on adhesives. Adhesives Dept., Raybestos-Manhattan Inc., Bridgeport, Conn.

Solving Maintenance Problems

"Technical Data Sheet 13, An Index to Solving Maintenance Problems" discusses 78 industrial maintenance products. Fine Organics Inc., 205 Main St., Lodi, N. J.

Automatic Control Systems

Charts, diagrams, and photographs of both electronic and pneumatic systems are included in a 24 page bulletin (MSA-190). The application of data processing equipment to 11 areas of blast furnace operations is also described. Controls Div., Hagan Chemicals & Controls Inc., Hagan Center, Pittsburgh 30, Pa.

Lubrication Manual

"Keep Your Upkeep Down" is the title of a 59 page brochure that includes a correlation of lubricant viscosity with speed, radius, and clearance of journal bearings based on general design practice. It enables lubrication engineers to quickly determine suitable oil viscosity for journal bearings without resorting to load analyses or estimates. Atlantic Refining Co. Inc., 260 S. Broad St., Philadelphia 1, Pa.

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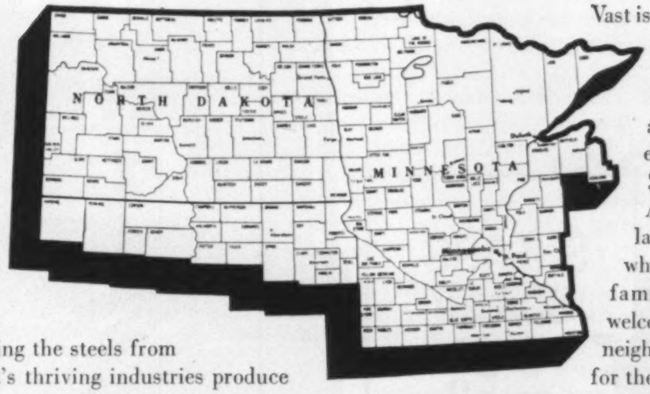

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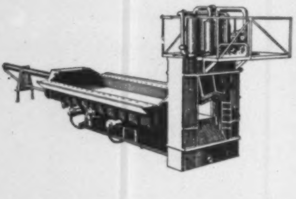

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Inventories Nearing Ten Year Low

STEEL inventories are approaching their lowest level in a decade.

That's the opinion of Alan Greenspan, head of the New York economic consulting firm of Townsend-Greenspan & Co. He estimates that consumers have about 11 million tons in inventory, or less than they did at the end of last year's, 116 day strike. Stocks are better balanced now than they were then, of course, so there's no crisis.

CUTBACKS CONTINUE—Mr. Greenspan and other analysts believe that inventories have been cut by as much as 8 million tons since April, making for an average monthly reduction of more than 1 million tons. Consumers are thought to be consuming steel at the rate of about 6 million tons a month. But this month they'll probably get less than 5 million tons from their suppliers (both U. S. and foreign), so their stockpiles could again shrink by 1 million tons.

TURNAROUND COMING—Unless consumption collapses, inventory liquidation should end during the first quarter of next year. Many large consumers expect to complete their adjustments by the end of this month. When they start buying as much steel as they're using, demand will increase by 1 million tons a month. To produce the additional tonnage, steelmakers will have to boost their operations to at least 60 per cent of capacity.

GRADUAL RECOVERY—It won't happen overnight, of course. All buyers won't stop cutting their inventories at the same time. They'll be guided by seasonal factors and market conditions in their own industries. Normally, there's little improvement in steel demand from December to February. There may be a slight upturn this time because December was so slow.

SEASONAL PICKUP—As the first quarter progresses, you can look for increased buying by canmakers, appliance manufacturers, and farm equipment producers. They'll have their steel inventories in shape, and they'll be building up stocks of finished goods for spring sales. Appliance makers expect more than seasonal gains; they see a basic improvement in the sales outlook for their products.

AUTOMAKERS IMPORTANT— Despite favorable trends in other industries, automakers will have a dominant influence on the market's first quarter strength—or lack of it. They'll be watching new car sales closely, gearing their production to retail deliveries and steel purchases to production. Unless people continue buying the new models at a brisk rate, first quarter auto output will be substantially less than the fourth quarter's estimated 1.75 million.

LITTLE ADVANCE BUYING—Although some mills report that they have more orders on their books for January than they had a month ago for December, the general feeling is that most buyers are concentrating on their immediate requirements. Ignoring traditional leadtimes, they're ordering most of their tonnage in the month when they expect to have it shipped. What's more, they're trying to get the mills to accept less-than-carload orders. Steelmakers say they're not honoring such requests, but they are accepting an increasing volume of orders for miscellaneous cars —loads that consolidate small tonnages of several products.

PRODUCTION STEADY—Look for steel production to continue its sidewise movement at less than 50 per cent of capacity this week. Last week, operations dipped 0.6 percentage point to 48.3 per cent of capacity. Output: About 1,376,000 ingot tons.

WHERE TO FIND MARKETS & PRICES

	News	Prices		News	Prices
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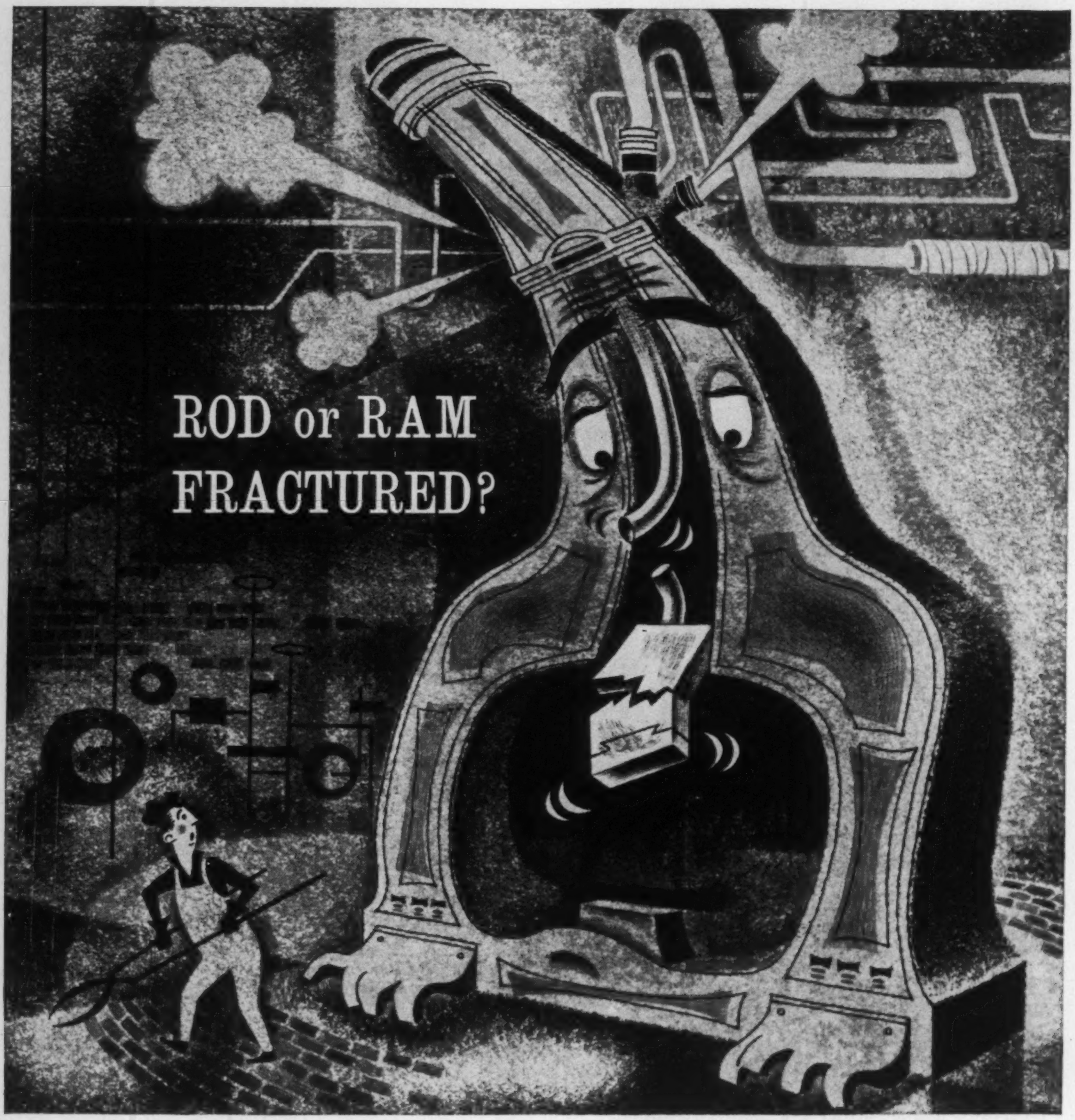

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Outlook Bright for Thin Tin In Clash with Aluminum Cans

THE BATTLE for supremacy in the container market is getting hotter as more steelmakers plan volume production of light gage tin plate.

Only one company, U. S. Steel Corp., has announced commercial availability of the product, but at least three others (Jones & Laughlin Steel Corp., Bethlehem Steel Co., and Weirton Steel Div. of National Steel Corp.) are supplying it to canmakers. They're said to be ready and willing to go into full production when demand warrants—even if they have to use temporary equipment.

• **More Capacity Coming**—Granite City Steel Co. has ordered a 6400 hp, Sendzimir, cold strip mill on which it expects to start production of thin tin plate by the second quarter of next year. Youngstown Sheet & Tube Co. is installing a six stand cold mill at Indiana Harbor, Ind., which may be used for the same purpose. Wheeling Steel Corp. says it's considering the extension of its line of coated products into light gage tin plate.

What's behind the big push? Steel industry determination to keep customers satisfied, hold established markets, and find new ones.

The stakes are high. Tin plate accounts for 7 per cent of the industry's product shipments. Tin cans and other containers consume more than three-fourths of the tonnage that is shipped each year—an estimated 42 billion cans will be produced this year.

Competition is rough. Glass, paper, plastics, and aluminum are chipping away at traditional tin plate markets. Examples:

- Throwaway bottles are taking a bigger chunk of the beer container business. Through August, they had 8.7 per cent of the market vs. 6.4 per cent a year ago. Cans had 38.2 per cent, down from 40.3 in the corresponding period of 1959. (Returnable bottles held steady at about 53 per cent.)
- Aluminum has captured at least 25 per cent of the market for 6 ounce, frozen fruit juice containers. Only last week, five citrus processing firms in Florida announced they have adopted all-aluminum cans for frozen juice—110 millions cans will be required. Another 265 million, 6 ounce cans will have aluminum bodies with tin plate ends, reported the processors.

• **Steel Fights Back**—Although the threat from aluminum hasn't reached alarming proportions—15,000 tons shipped to canmakers through September vs. 3.5 million tons of tin plate—steelmen figure they're in for a real battle. To offset aluminum's biggest sales pitch (less weight means lower freight and handling costs), they're developing thinner, stronger, and lighter tin plate. U. S. Steel's Ferrolite, the first such product to be marketed, boasts two features that should appeal to canmakers: 1. It weighs only a little more than half as much as conventional tin plate (40 to 60 lb per base box instead of 75 to 100 lb). 2. It costs about one-third less.

• **Canmakers React**—What do the can companies think of thin tin? Here's what one company told STEEL: "We're enthusiastic. It has a tremendous potential in many types of cans where competitive materials wouldn't have a chance. Of course, it's still in the semicommercial stage on volume and quality. We're not buying much—only a

At U. S. Steel's Irvin (Pa.) Works, a Ferrolite can gets close inspection from (left to right) Robert B. Meneilly, general manager of tin mill products; Dr. Robert B. Mears, assistant vice president-applied research; and R. F. Roelofs, assistant superintendent, tin finishing

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small percentage of our total tin plate use. But we're giving the mills a regular, substantial outlet for their material. That helps us iron out certain difficulties and get a feel of the market.

"There are still some problems, but none that will take too long to resolve. One is uniformity of gage. That's awfully important when you're running thin material through high speed machines. We've had to modify our equipment to handle it, but we've been able to run it at regular speeds in making 6 ounce cans. Efficiencies have been good."

- **Competitive Costs** — Canmakers say there's not much difference between the costs of aluminum and thin tin. They're using 0.008 gage aluminum and 55 lb tin plate interchangeably. Aluminum costs more per base box ($7.16 vs. tin plate's $6.40) but has compensating cost advantages: 1. Quoted price is the delivered price—no additional freight. 2. Better scrap recovery on can ends (an estimated saving of 25 cents per base box). 3. No need to precoat can ends before lithographing, as with tin plate.

Is thin tin regaining markets for steel that aluminum seized? Not yet, say the canmakers, but it's forcing citrus packers to think twice about jumping on the aluminum bandwagon. "By the end of the season, they'll have to make up their minds," a major can company comments. "They're trying to decide whether aluminum's glamour has extra sales appeal."

- **Disappointing Year**—Will thin tin's introduction help offset 1960's disappointing sales of standard tin plate? Not significantly, steelmakers report. Reasons for this year's poor showing: 1. Bad weather hurt some crops, reducing food packs. 2. Brewers and packers have been using a lot of cans that they bought last year, when they built big inventories to protect themselves against the steel strike. 3. Throwaway bottles have cut into the beer can market. Beer consumption through September was up 0.5 per cent (500,000 barrels), but beer can shipments were off 8 per cent. 4. Motor oil consumption is off because compact cars use less than

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standards, and automakers have been telling people they needn't change oil so frequently. Result: Oil can shipments are off 19 per cent.

In the first nine months, steelmakers shipped 4.28 million tons of electrolytic tin plate. There's little hope of equaling the 1958 record (5.04 million tons), but there's an outside chance of matching last year's 4.86 million.

Tin Plate . . .

Tin Plate Prices, Page 120

Metal container prices have been increased 2 to 2.5 per cent by the major can manufacturers. Effective date: Jan. 1, 1961. The new quotations are expected to hold throughout 1961, barring changes in tin plate prices and freight rates.

Both tin plate and aluminum cans are affected by the new schedule. Under the new schedule, a $\frac{1}{4}$ lb electroplate, inside enamel can, No. 1 size, will cost $27.64 per 1000, f.o.b. Baltimore. The former price was $26.94. The price on the No. 10 can, in the same finish, will rise to $119.26 per 1000, from $116.62.

Inland Steel Co. has retired its last two, hot dip tin pots at the Indiana Harbor Works. The company ceased making regular, hot dipped tin plate in 1956, and since then, it has used the process only for recoating secondary electrolytic tin plate. When the new No. 3 electrolytic line started up in September, the tin mill acquired sufficient plating capacity to enable it to completely discontinue hot dip operations. Now, for the first time since the tin mill began operating in 1933, all the company's tin plate is being produced by the electrolytic process. Hot dip operations had been gradually reduced since 1942, the last year in which all the 24 pots were operated.

Tubular Goods . . .

Tubular Goods Prices, Page 124

Producers of oil country goods sold about the same amount of tubing and casing in November as they did in October. Little change is expected this month. There's still a fairly big stock of tubing in the field—in downriver terminals, jobbers' warehouses, and consumers' yards.

It's thought that some major oil producers may have to resume buying such items as $4\frac{1}{2}$ in. casing and $2\frac{3}{8}$ to $2\frac{7}{8}$ in. tubing. Their stocks are down to bedrock on the popular sizes, though they're well stocked on high priced specialties.

January orders have started coming in, but it's too early to tell whether the month will be any better than December. Buyers aren't showing much interest in booking ahead. They don't expect their drilling activity to climb significantly in the first quarter.

The latest weekly report of the Hughes Tool Co. shows a decrease of 48 rotary rigs in operation in the U. S. and Canada. The U. S. lists 1816 active rigs, down 42; Canada, 141, off 6.

An order for high quality steel conduit and water piping to be used in construction of New York's Cannonsville Dam in Delaware County, N. Y., has been booked by Alco Products Inc., Dunkirk, N. Y. Shipment of the carbon steel, clad steel, and stainless steel piping, which will

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be manufactured at the company's Dunkirk plant, will be during the second quarter next year. The piping will weigh more than 225 tons and will range 2 to 14 ft in diameter.

Distributors . . .

Prices, Page 125

For the second consecutive month, steel service centers look for a decline in business in December. Major blame is placed on seasonal factors, although the comparatively low level of consumption and the withdrawal of tonnages from users' stocks reduce the need for fresh purchases from distributors.

Service centers hold ample stocks in all categories. The flow of wasters from the mills is having an easing effect on prices for prime sheets.

Surplus stocks of imported steel are disappearing and little interest is being shown in future imports. Quotations in the Houston area on imported reinforcing bars, rounds, angles, flats, channels and I-beams have increased slightly. The upward revisions are more than enough to balance the higher ocean freight rates which become effective Jan. 1.

A major distributor says foreign suppliers are offering ocean freight savings to buyers willing to accept delivery by independent lines instead of by the conference steamers. In some instances, that would mean slower and more roundabout delivery.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 119 & 120

Sheetmakers report requests for deferments of some deliveries until early next year. However, inventories are low, and with most buyers ordering spot needs, they are anxious to take in tonnages ordered.

General feeling in the trade is that buying will improve somewhat next month. Deliveries now are running two to three weeks on hot rolled sheets, two to four weeks on cold rolled, and two to three weeks on galvanized.

November volume was slightly better than October's from a shipping standpoint, but bookings didn't improve. At some mills, they were a little below the previous month's. Most sellers don't anticipate much change in market conditions until next month.

Strip steel production in New England is largely in specialties, and production is off. Strip and flat bars are being turned out at about 50 per cent of capacity in the St. Louis area, but prospects are not promising for January.

September Steel Imports Rise as Exports Decline

Iron and steel imports (including iron products and ferroalloys) in September exceeded exports in volume (303,795 net tons vs. 278,757 tons) but were smaller dollarwise ($39,082,796 vs. $59,062,759), reports the U. S. Department of Commerce. Imports in August totaled 252,222 tons, valued at $33,684,038, while in September, 1959, they were 463,520 tons, valued at $58,100,318.

August exports totaled 356,579 tons, valued at $73,247,473. In September, 1959, the total was only 83,563 tons, valued at $26,238,607.

In the first nine months this year, imports amounted to 3,329,603 net tons, valued at $462,517,041. That compares with 3,771,895 tons, valued at $433,007,444, in the same period last year.

Exports totaled 2,663,569 tons, valued at $588,091,217, in the first nine months this year compared with 1,791,197 tons, valued at $429,456,751, in the same period of 1959.

Steel Bars . . .

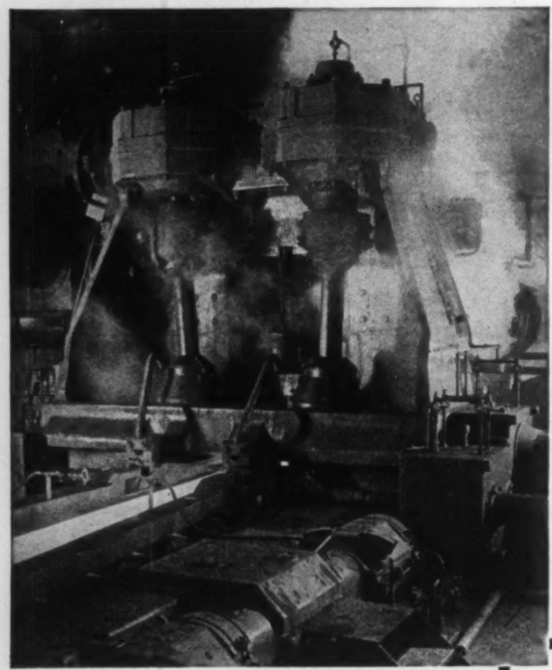
Bar Prices, Page 118

Little forward buying is noted in hot rolled carbon or cold drawn. Deliveries on hot bars range two to four weeks and on cold drawn a week to three weeks. Some cold drawn material can be had from stock.

Contrary to expectations, cold drawn producers booked less business in November than they did in October. Sales have been declining steadily since September, when there was a short-lived rally.

At one of the smaller cold finishing mills, production has been cut 35 per cent.

Prospects for December aren't encouraging. Service centers are buy-



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ing on a fill-in basis, but direct mill customers are continuing to trim their inventories because of production cutbacks. December will probably be the slowest month of the year. Cold finishers are looking for an upturn in the first quarter.

Wire . . .

Wire Prices, Pages 120 & 123

Domestic producers of wire and wire products are encountering sharp competition from foreign mills, particularly in the merchant items. However, the local mills have an advantage because they can ship from stock.

Some producers of manufacturers' wire are engaged at 85 per cent of capacity. Their operations are sustained partly by steady year-round customers. But a spurt of 35 per cent or more in demand for upholstery springs for the automotive industry and furniture manufacturers is reported. There is little activity in demand for springs on agricultural implement account.

Demand for wire in the building and construction industries is shrinking seasonally. Mesh output is practically nil at some points, reflecting the seasonal falling off in paving requirements. Mesh for buildings and pipe is moving slowly.

Plates . . .

Plate Prices, Page 118

Although plate producers are reporting improved inquiry for heads and specialties, no gain in orders is noted. Most of the mills can ship tonnage within ten days to two weeks on sheared and universal plates, and three to five weeks on alloy plates.

One bright spot in the market is provided by the final placing of four cargo ships for the American Export Lines with the Sun Shipbuilding & Dry Dock Co., Chester, Pa. About 28,000 tons of steel, mostly plates, will be required.

Contracts include 900 tons for a discharge line at the St. Joseph Dam in Washington State. Pending work includes 900 tons for a city water tank at Portland, Oreg., and 1000 tons for a tank farm at Vancouver, Wash.

U. S. Steel Corp. last week introduced a new constructional alloy steel which will be available as

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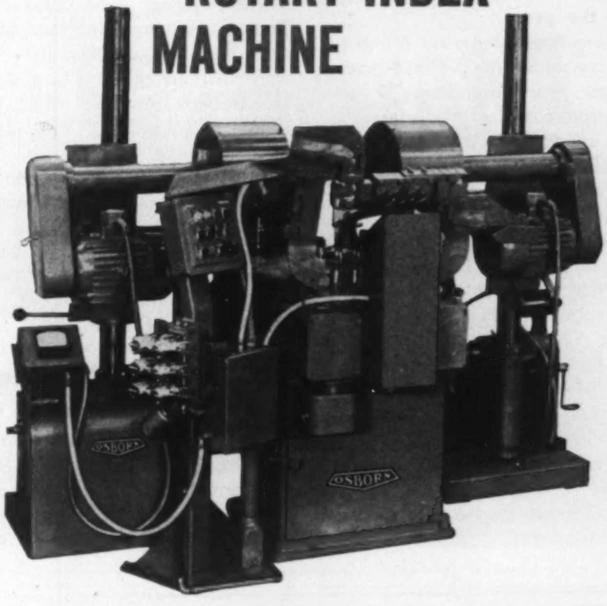

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Power, Paint and Maintenance Brushes • Foundry Production Machinery

quenched and tempered plates and bars 3/16 to 1 in. thick. It is designated as USS "T-1" type A steel.

Pig Iron . . .

Pig Iron Prices, Page 125

Demand for merchant pig iron will continue to decline the remander of this month. The drop will be particularly pronounced in the final week of the year.

Merchant iron producers are putting a considerable part of their production into inventory. Hot metal output at steel mills also is running ahead of needs. That indicates likelihood of further cuts in blast furnace operations. The Swedeland, Pa., producer, recently noted as having resumed operations on one of its two furnaces, will close down its other stack around Dec. 15 for repairs.

In the Seattle area, foreign pig iron is favored over domestic because of lower costs. A leading consumer there is buying pig in South Africa and receiving delivery in about six months. The price advanced $1.50 a ton recently, but it still is competitive with that on the domestic product.

Pig iron exports in September totaled 14,668 net tons compared with none in August, and 75 tons in September, 1959, reports the U. S. Commerce Department. Total exports of pig iron in the first nine months of this year were 17,944 tons vs. 8794 tons in the same period last year.

Of the total movement in September, Japan took 14,000 tons; Taiwan, 600; and Uruguay, 68. The nine months' exports by country were: Argentina, 28; Canada, 281; Dominican Republic, 2312; Japan, 14,000; Philippines, 381; Taiwan, 874; Uruguay, 68.

Imports of pig iron in September amounted to 60,182 tons compared with 35,114 in August, and 51,417 in September, 1959. In the first nine months of this year, the total was 241,910 tons vs. 445,682 in the same period of 1959.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 126

Coke production (oven and beehive) in October totaled 3,930,793 net tons vs. 3,649,399 in September this year and 1,838,600 in October, 1959. Of the month's total output, 3,879,179 tons were oven coke and 51,614 beehive. In October, 1959, oven coke output was 1,800,700 tons and beehive 37,900.

Producers' stocks of oven coke at the end of October totaled 4,627,974 net tons, equal to 37 days' production. The total compared with 4,452,020 tons on the last day of September and 4,985,419 at the end of October, 1959.

Scrapmen Consider Market Problems at Convention

Technological changes in the steel industry confront scrap dealers with a grave problem: Greater use of hot metal has been at the expense of scrap, and the dealers, geared to higher output through heavy investment in machinery and equipment, find themselves squeezed between high overhead and low demand.

The problem, says Lester Shapiro, president, National Federation of Independent Scrap Yard Dealers (which held its seventh annual convention in New York last week) is to recapture lost markets. In this, he thinks, they may be aided by new techniques in steelmaking, such

EXECUTIVE REPORT #32

$40,000 Annual Saving in Weldment Cleaning

Towmotor Corp. saved $40,000 a year on weldment cleaning with Wheelabrator airless blast cleaning. Removing scale, welding flux and spatter from lift truck components with the Wheelabrator resulted in these benefits: Manual wire brushing and sanding were eliminated. Descaling time was reduced by one half to two-thirds. Paint adheres better to the blast-cleaned surface, and product quality was improved by exposing sub-standard welds.

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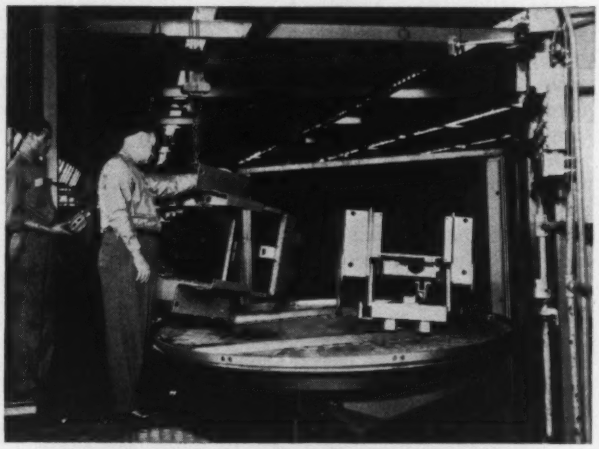
. . . we will gladly show you the results of Wheelabrator airless blast cleaning on your particular parts, including a demonstration in our customer-service laboratory. Write to Wheelabrator Corp., 509 S. Byrkit St., Mishawaka, Indiana. In Canada, P.O. Box 490, Scarborough, Ontario.



WHEELABRATOR
AIRLESS BLAST EQUIPMENT

as use of the oxy-fuel lance (not to be confused with the ordinary oxygen lance).

"It is a new development," says Mr. Shapiro, "which is capable of driving tremendous blocks of heat into a furnace. Already this oxy-fuel lance has proved that it can beef up open hearth output to equal the L-D converter; and remember, this is only the first impact; the full potential can be enormous."

But the dealers have a job of their own, he asserts—to prove that they can be of economic benefit to the consumer and to persuade the government "to help us achieve the balance we cannot find alone."

Scrap is admittedly essential to national defense, says Mr. Shapiro, but it is, or should be, of "infinite value" in peacetime. It is here, and in the light of public interest, that the government can be of help, he says.

Structural Shapes . . .

Structural Shape Prices, Page 118

Structural fabricators report greater diversity of inquiry. Government work is still outstanding, but more industrial and commercial jobs are developing. Producers of plain material anticipate a tightening schedule after the turn of the year. Their deliveries continue to range two to four weeks.

After a pickup in October, demand for structurals has leveled off in the Pittsburgh area. Producers have less tonnage on their books than they had a month ago.

With the recent slowdown in forward buying, steelmakers have little reason to expect better business in January in light of the seasonal slowdown in construction.

More tonnage is being estimated for urban renewal construction projects in New England. New Haven and Hartford programs are well along, much of the structural tonnage now being in shops.

Canada . . .

Canadian mills consumed 1.4 per cent more iron ore in the first nine months this year than they did in the same period last year. With steel production down from the record rate early this year, the gain in ore use has been narrowing since spring. Consumption was ahead of 1959's in each of the first five

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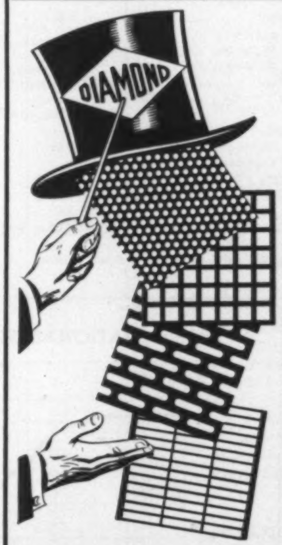
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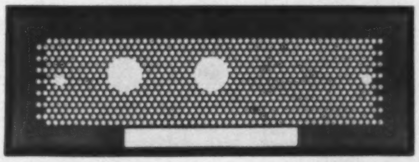
We're not magicians but, in nearly half a century of successful experience, have acquired such a wide range of dies, tools and other plant facilities that almost anything in the way of perforated metal sheets, plates, or parts can be produced efficiently and economically.

Our new 32-page **"Catalog 59"** illustrates a great variety of perforated metal patterns and gives complete working data. Also shows many modern industrial applications. Write for a free copy and let us quote on your requirements. When given sufficient information, our experienced engineers are often able to make money-saving suggestions—without charge or obligation.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months, but every month since has witnessed a decline.

Consumption in September showed a 4.7 per cent gain over that of August this year, but the month's total of 516,194 tons was 8.9 per cent below the 566,790 tons consumed in September, 1959.

Lake Superior Iron Ore Shipments Top '59 Total

Shipments of Lake Superior iron ore in the 1960 lake shipping season, just closed, totaled 69,631,789 gross tons—65,903,096 tons were shipped from U. S. ports, 3,728,693 from Canadian. The total represented an increase of 25,926,288 tons over the movement of 43,705,501 tons in the strike-ridden 1959 shipping season.

November shipments amounted to 1,942,980 tons, a decrease of 3,477,924 tons from the November, 1959, total of 5,420,904 tons. Last year, shipments were pressed at fleet capacity following the steel strike; this year, the tonnage movement was sharply curtailed because of sluggish steel production.

Stocks of iron ore (U. S. and Canada; all sources) at the start of November were 81,522,591 gross tons, compared with 65,940,864 tons on the same date in 1959. Lake Superior iron ore stocks (U. S.) amounted to 47,034,404 tons against 33,186,350 a year ago. Stocks of other U. S. ores totaled 3,587,448 tons vs. 3,109,463; Canadian ores: Lake Superior, 2,367,052 vs. 2,208,097, other, 6,572,660 vs. 9,420,683; foreign ores, 18,110,753 vs. 15,057,955.

For detailed breakdown see table.

October consumption of iron ore totaled 7,261,576 gross tons compared with 2,156,844 in the same month last year. Consumption during the year through October was 95,510,278 tons vs. 81,200,063 in the same period of 1959. See table for breakdown as to ore sources.

Iron Ore Statistics—October, 1960

IRON ORE STOCKS, U. S. & CANADA—OCTOBER, 1960

(Gross tons)

	U. S. Ores		Canadian Ores		Foreign	
At U. S. Yards:	L. Sup.	Other	L. Sup.	Other	Ores	Total
Start of Month	40,860,086	3,654,821	2,014,657	5,409,820	15,705,710	67,645,197
End of Month:						
Mass., N. Y.	3,770,533	29,750	86,413	247,044	328,618	4,462,358
Pennsylvania	8,787,779	446,496	31,285	232,523	7,860,525	17,358,608
Md., Va., W. Va.	678,028	2,267	....	2,411,495	2,408,261	5,500,051
Ky., Tenn., Tex.	392,289	176,954	....	438,318	116,826	1,124,387
Alabama	871	1,824,134	....	127,075	3,462,878	5,414,958
Ohio	11,402,154	35,162	883,810	2,093,821	1,187,557	15,602,504
Indiana	8,959,886	18,551	618,937	1,671	60,848	9,659,893
Illinois	5,562,024	51,121	59,757	....	258,787	5,931,689
Mich., Minn.	3,768,559	....	471,355	123,242	413,179	4,776,335
Colo., Utah, Calif.	....	1,000,491	....	....	21,690	1,022,181
Undistributed	1,014	2,522	....	....	224	3,760
End of Month	43,323,137	3,587,448	2,151,557	5,675,189	16,119,393	70,856,724
At U. S. docks	3,711,267	....	215,495	897,471	1,991,360	6,815,593
Total U. S.	47,034,404	3,587,448	2,367,052	6,572,660	18,110,753	77,672,317
Canada Yards:						
Start of Month	2,973,220	....	172,799	475,983	42,904	3,664,906
End of Month	3,111,041	....	146,206	541,869	51,158	3,850,274
Total: U. S.-Canada	50,145,445	3,587,448	2,513,258	7,114,529	18,161,911	81,522,591

IRON ORE CONSUMPTION, U. S. & CANADA—OCTOBER, 1960

(Gross tons)

	U. S. Ores		Canadian Ores		Foreign	
In U. S.:	L. Sup.	Other	L. Sup.	Other	Ores	Total
Mass., N. Y.	343,951	25,221	4,400	8,954	16,515	399,041
Pennsylvania	733,916	145,062	2,588	20,105	662,391	1,564,062
Md., Va., W. Va.	83,329	19,670	....	231,996	308,417	643,412
Ky., Tenn., Tex.	41,079	51,796	....	47,910	39,024	179,809
Alabama	....	312,766	....	....	126,555	439,321
Ohio	834,131	18,166	25,600	105,873	123,642	1,107,412
Indiana	725,738	11,611	77,438	....	4,675	819,462
Illinois	454,825	17,614	7,607	....	39,705	519,751
Mich., Minn.	443,252	....	55,003	15,119	20,055	533,429
Colo., Utah, Calif.	....	473,987	....	....	14,312	488,299
Undistributed	139	135	....	....	9	283
In U. S.:						
Blast furnaces	2,347,266	579,470	91,928	147,523	434,773	3,600,960
Steel furnaces	84,540	47,707	4,896	6,961	334,440	478,544
Sintering	1,228,471	443,087	75,812	275,473	586,016	2,608,859
Miscellaneous	83	5,764	....	....	71	5,918
Total U. S.	3,660,360	1,076,028	172,636	429,957	1,355,300	6,694,281
In Canada:						
Blast furnaces	235,241	....	92,709	84,018	8,993	420,961
Steel furnaces	....	....	....	23,718	8,841	32,559
Sintering	88,977	....	3,009	21,748	....	113,734
Miscellaneous	41	....	....	....	....	41
Total Canada	324,259	....	95,718	129,484	17,834	567,295
Total U. S.-Canada	3,984,619	1,076,028	268,354	559,441	1,373,134	7,261,576

Data from American Iron Ore Association.

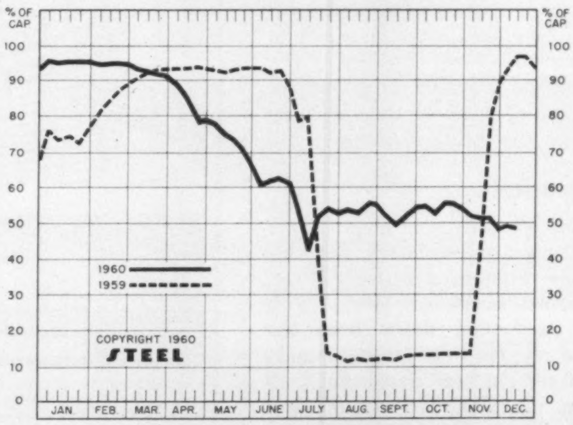
DISTRICT INGOT RATES

(Percentage of capacity utilized)

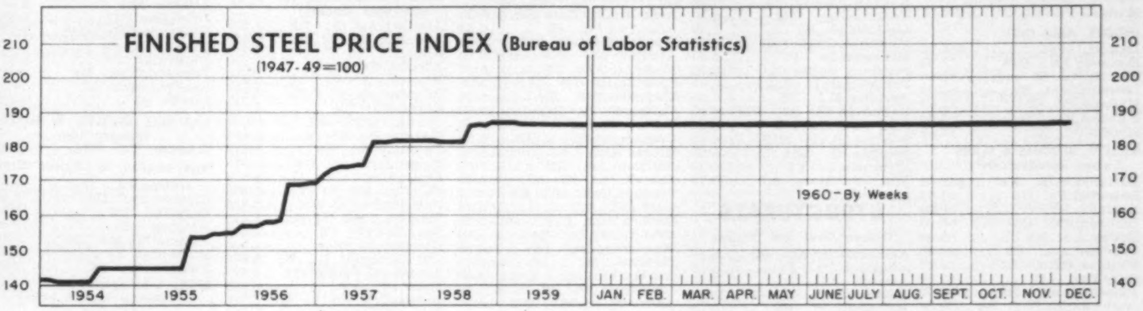
	Week Ended Dec. 11	Week Ago	Month Ago	Year Ago
Northeastern	51	51	54	102
Buffalo	42	45	54	100
Pittsburgh	44	46	48	97
Youngstown	36	37	38	94
Cleveland	46	50	57	96
Detroit	61	61	68	99
Chicago	51	52	51	97
Cincinnati	51	50	57	93
St. Louis	65	61	75	115
Southern	54	55	53	92
Western	51	48	50	95
Total Industry	48.3	48.9	51.5	96.5
Index (1947-49=100)	85.7	86.7	91.4	170.1
Net Tons (In thousands)	1,376	1,393	1,468	2,732

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Dec. 6, 1960	Week Ago	Month Ago	Nov. Index	Year Ago
186.2	**186.2**	**186.2**	**186.2**	**186.8**

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Dec. 6

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1 ...	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb) ...	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloys, High Speed, W18, Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	6.335
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.775
Sheets, C.R., Stainless, 302 (lb)	0.658
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.489
Strip, C.R., Stainless, 430 (lb)	0.480
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.495
Pipe, Galv., Buttweld (100 ft)	23.098
Pipe, Line (100 ft)	195.430
Casing, Oil Well, Carbon (100 ft)	201.080
Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft) ...	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft.)	194.268
Tin plate, Hot-dipped, 1.25 lb (95 lb base box) ...	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (Bundles)	7.647
Nails, Wire, 8d Common.	9.433
Wire, Barbed (80-rod spool)	8.414
Woven Wire Fence (20-rod roll)	21.003

STEEL's FINISHED STEEL PRICE INDEX

	Dec. 7 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100) ..	247.82	247.82	247.82	247.82	208.90
Index in cents per lb	6.713	6.713	6.713	6.713	5.659

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.14
No. 2 Fdry, Pig Iron, GT.	66.49	66.49	66.49	66.49	58.99
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.49
Malleable Pig Iron, GT ...	67.27	67.27	67.27	67.27	59.77
Steelmaking Scrap, GT ...	28.67	28.83	28.85	42.83	48.83

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Dec. 7 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5 97	5.97	5.97	5.975	4.90
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.90
Shapes, Std., Pittsburgh ...	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia..	5.745	5.745	5.745	5.77	4.88
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.80
Sheets, H.R., Pittsburgh ...	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh ...	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh ..	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.25
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb)box,Pitts.	$10.65	$10.65	$10.65	$10.65	$9.45

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*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, $\frac{7}{32}$-⅝" Pitts. ...	6.40	6.40	6.40	6.40	5.025

PIG IRON, Gross Ton	Dec. 7 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$59.50
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia ..	70.18	70.18	70.18	70.41	62.16
No. 2 Fdry, NevilleIsland,Pa.	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, deld., Phila. ..	70.68	70.68	70.68	70.91	62.66
No. 2 Fdry, Birmingham ..	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.),deld.,Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	59.00
Ferromanganese, net ton†..	245.00	245.00	245.00	245.00	190.00

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$26.50	$26.50	$26.50	$41.50	$47.50
No. 1 Heavy Melt, E. Pa. .	34.00	34.00	34.00	45.00	50.00
No. 1 Heavy Melt, Chicago .	25.50	26.00	26.00	42.00	49.00
No. 1 Heavy Melt, Valley ..	26.50	26.50	26.50	43.50	52.50
No. 1 Heavy Melt, Cleve. ..	23.50	23.50	23.50	40.50	49.50
No. 1 Heavy Melt, Buffalo.	23.50	23.50	23.50	33.50	43.50
Rails, Rerolling, Chicago ...	46.50	46.50	46.50	61.50	73.50
No. 1 Cast, Chicago	36.50	36.50	36.50	54.50	49.50

COKE, Net Ton

Beehive, Furn., Connlsvl. ..	$15.00	$15.00	$15.00	$15.00	$13.625
Beehive, Fdry., Connlsvl. ..	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee ...	32.00	32.00	32.00	32.00	26.25

Steel Prices

Mill prices as reported to STEEL, Dec. 7, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 119; footnotes, page 123.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5	$76.00

INGOTS, Alloy (NT)

Detroit S41	$82.00
Economy,Pa. B14	82.00
Farrell,Pa. S3	82.00
Lowellville,O. S3	82.00
Midland,Pa. C18	82.00
Munhall,Pa. U5	82.00
Sharon,Pa. S3	82.00

BILLETS, BLOOMS & SLABS

Carbon Rerolling (NT)

Bartonville,Ill. K4	$82.00
Bessemer,Pa. U5	80.00
Buffalo R2	80.00
Clairton,Pa. U5	80.00
Ensley,Ala. T2	80.00
Fairfield,Ala. T2	80.00
Fontana,Calif. K1	90.50
Gary,Ind. U5	80.00
Johnstown,Pa. B2	80.00
Lackawanna,N.Y. B2	80.00
Munhall,Pa. U5	80.00
Owensboro,Ky. G8	80.00
S.Chicago,Ill. R2, U5	80.00
S.Duquesne,Pa. U5	80.00
Sterling,Ill. N15	80.00
Youngstown R2	80.00

Carbon, Forging (NT)

Bessemer,Pa. U5	$99.50
Buffalo R2	99.50
Canton,O. R2	102.00
Clairton,Pa. U5	99.50
Conshohocken,Pa. A3	104.50
Ensley,Ala. T2	99.50
Fairfield,Ala. T2	99.50
Farrell,Pa. S3	99.50
Fontana,Calif. K1	109.00
Gary,Ind. U5	99.50
Geneva,Utah C11	99.50
Houston S5	104.50
Johnstown,Pa. B2	99.50
Lackawanna,N.Y. B2	99.50
LosAngeles B3	109.00
Midland,Pa. C18	99.50
Munhall,Pa. U5	99.50
Owensboro,Ky. G8	99.50
Seattle B3	109.00
Sharon,Pa. S3	99.50
S.Chicago R2, U5, W14	99.50
S.Duquesne,Pa. U5	99.50
S.SanFrancisco B3	109.00
Warren,O. C17	99.50

Alloy, Forging (NT)

Bethlehem,Pa. B2	$119.00
Bridgeport,Conn. C32	119.00
Buffalo R2	119.00
Canton,O. R2, T7	119.00
Conshohocken,Pa. A3	126.00
Detroit S41	119.00
Economy,Pa. B14	119.00
Farrell,Pa. S3	119.00
Fontana,Calif. K1	140.00
Gary,Ind. U5	119.00
Houston S5	124.00
Ind.Harbor,Ind. Y1	119.00
Johnstown,Pa. B2	119.00
Lackawanna,N.Y. B2	119.00
LosAngeles B3	139.00
Lowellville,O. S3	119.00
Massillon,O. R2	119.00
Midland,Pa. C18	119.00
Munhall,Pa. U5	119.00
Owensboro,Ky. G8	119.00
Seattle(6) B3	140.00
Sharon,Pa. S3	119.00
S.Chicago R2,U5,W14	119.00
S.Duquesne,Pa. U5	119.00
Struthers,O. Y1	119.00
Warren,O. C17	119.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2	$122.50
Canton,O. R2	125.00
Cleveland R2	122.50
Gary,Ind. U5	122.50
S.Chicago,Ill. R2,W14	122.50
S.Duquesne,Pa. U5	122.50
Warren,O. C17	122.50

SKELP

Aliquippa,Pa. J5	5.05
Benwood,W.Va. W10	5.05
Ind.Harbor,Ind. Y1	5.05
Munhall,Pa. U5	5.05
Pittsburgh J5	5.05
Warren,O. R2	5.05
Youngstown R2, U5	5.05

WIRE RODS

AlabamaCity,Ala. R2	6.40
Aliquippa,Pa. J5	6.40
Alton,Ill. L1	6.60
Bartonville,Ill. K4	6.50
Buffalo W12	6.40
Cleveland A7	6.40
Donora,Pa. A7	6.40
Fairfield,Ala. T2	6.40
Houston S5	6.65
IndianaHarbor,Ind. Y1	6.40
Johnstown,Pa. B2	6.40
Joliet,Ill. A7	6.40
KansasCity,Mo. S5	6.65
Kokomo,Ind. C16	6.50
LosAngeles B3	7.20
Minnequa,Colo. C10	6.65
Monessen,Pa. P7	6.40
Pittsburg,Calif. C11	7.20
Portsmouth,O. P12	6.40
Roebling,N.J. R5	6.50
S.Chicago,Ill. R2, W14	6.40
SparrowsPoint,Md. B2	6.50
Sterling,Ill.(1) N15	6.40
Sterling,Ill. N15	6.50
Struthers,O. Y1	6.40
Worcester,Mass. A7	6.70

STRUCTURALS

Carbon Steel Std. Shapes

AlabamaCity,Ala. R2	5.50
Aliquippa,Pa. J5	5.50
Atlanta A11	5.70
Bessemer,Ala. T2	5.50
Bethlehem,Pa. B2	5.55
Birmingham C15	5.50
Clairton,Pa. U5	5.50
Fairfield,Ala. T2	5.50
Fontana,Calif. K1	6.30
Gary,Ind. U5	5.50
Geneva,Utah C11	5.50
Houston S5	5.60
Ind.Harbor,Ind. I-2, Y1	5.50
Johnstown,Pa. B2	5.55
Joliet,Ill. P22	5.50
KansasCity.Mo. S5	5.60
Lackawanna,N.Y. B2	5.55
LosAngeles B3	6.20
Minnequa,Colo. C10	5.80
Munhall,Pa. U5	5.50
Niles,Calif. P1	6.25
Phoenixville,Pa. P4	5.55
Portland,Oreg. O4	6.25
Seattle B3	6.25
S.Chicago,Ill. U5, W14	5.50
S.SanFrancisco B3	6.15
Sterling,Ill. N15	5.50
Torrance,Calif. C11	6.20
Weirton,W.Va. W6	5.50

Wide Flange

Bethlehem,Pa. B2	5.55
Clairton,Pa. U5	5.50
Fontana,Calif. K1	6.45
IndianaHarbor,Ind. I-2	5.50
Lackawanna,N.Y. B2	5.55
Munhall,Pa. U5	5.50
Phoenixville,Pa. P4	5.55
S.Chicago,Ill. U5	5.50
Sterling,Ill. N15	5:50
Weirton,W.Va. W6	5.50

Alloy Std. Shapes

Aliquippa,Pa. J5	6.80
Clairton,Pa. U5	6.80
Gary,Ind. U5	6.80
Houston S5	6.90
Munhall,Pa. U5	6.80
S.Chicago,Ill. U5, W14	6.80

H.S., L.A., Std. Shapes

Aliquippa,Pa. J5	8.05
Bessemer,Ala. T2	8.05
Bethlehem,Pa. B2	8.10
Clairton,Pa. U5	8.05
Fairfield,Ala. T2	8.05
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.05
Geneva,Utah C11	8.05
Houston S5	8.15
Ind.Harbor,Ind. I-2, Y1	8.05
Johnstown,Pa. B2	8.10
KansasCity,Mo. S5	8.15
Lackawanna,N.Y. B2	8.10
LosAngeles B3	8.75
Munhall,Pa. U5	8.05
Seattle B3	8.80
S.Chicago,Ill. U5, W14	8.05
S.SanFrancisco B3	8.70
Sterling,Ill. N15	7.75
Struthers,O. Y1	8.05

H.S., L.A., Wide Flange

Bethlehem,Pa. B2	8.10
Ind.Harbor,Ind. I-2	8.05
Lackawanna,N.Y. B2	8.10
Munhall,Pa. U5	8.05
S.Chicago,Ill. U5	8.05
Sterling,Ill. N15	7.75

PILING

BEARING PILES

Bethlehem,Pa. B2	5.55
Ind.Harbor,Ind. I-2	5.50
Lackawanna,N.Y. B2	5.55
Munhall,Pa. U5	5.50
S.Chicago,Ill. I-2, U5	5.50

STEEL SHEET PILING

Ind.Harbor,Ind. I-2	6.50
Lackawanna,N.Y. B2	6.50
Munhall,Pa. U5	6.50
S.Chicago,Ill. I-2, U5	6.50
Weirton,W.Va. W6	6.50

PLATES

PLATES, Carbon Steel

AlabamaCity,Ala. R2	5.30
Aliquippa,Pa. J5	5.30
Ashland,Ky.(15) A10	5.30
Atlanta A11	5.50
Bessemer,Ala. T2	5.30
Clairton,Pa. U5	5.30
Claymont,Del. P4	5.30
Cleveland J5, R2	5.30
Coatesville,Pa. L7	5.30
Conshohocken,Pa. A3	5.30
Ecorse,Mich. G5	5.30
Fairfield,Ala. T2	5.30
Farrell,Pa. S3	5.30
Fontana,Calif.(30) K1	6.10
Gary,Ind. U5	5.30
Geneva,Utah C11	5.30
GraniteCity,Ill. G4	5.40
Harrisburg,Pa. P4	5.30
Houston S5	5.40
Ind.Harbor,Ind. I-2, Y1	5.30
Johnstown,Pa. B2	5.30
Lackawanna,N.Y. B2	5.30
Mansfield,O. E6	5.30
Minnequa,Colo. C10	6.15
Munhall,Pa. U5	5.30
Newport,Ky. A2	5.30
Pittsburgh J5	5.30
Riverdale,Ill. A1	5.30
Seattle B3	6.20
Sharon,Pa. S3	5.30
S.Chicago,Ill. U5, W14	5.30
SparrowsPoint,Md. B2	5.30
Sterling,Ill. N15	5.30
Steubenville,O. W10	5.30
Warren,O. R2	5.30
Youngstown U5, Y1	5.30
Youngstown(27) R2	5.30

PLATES, Carbon Abras. Resist.

Claymont,Del. P4	7.05
Fontana,Calif. K1	7.85
Geneva,Utah C11	7.05
Houston S5	7.15
Johnstown,Pa. B2	7.05
SparrowsPoint,Md. B2	7.05

PLATES, Wrought Iron

Economy,Pa. B14	14.10

PLATES, H.S., L.A.

Aliquippa,Pa. J5	7.95
Ashland,Ky. A10	7.95
Bessemer,Ala. T2	7.95
Clairton,Pa. U5	7.95
Claymont,Del. P4	7.95
Cleveland J5, R2	7.95
Coatesville,Pa. L7	7.95
Conshohocken,Pa. A3	7.95
Economy,Pa. B14	7.95
Ecorse,Mich. G5	7.95
Fairfield,Ala. T2	7.95
Farrell,Pa. S3	7.95
Fontana,Calif.(30) K1	8.75
Gary,Ind. U5	7.95
Geneva,Utah C11	7.95
Houston S5	8.05
Ind.Harbor,Ind. I-2, Y1	7.95
Johnstown,Pa. B2	7.95
Munhall,Pa. U5	7.95
Pittsburgh J5	7.95
Seattle B3	8.85
Sharon,Pa. S3	7.95
S.Chicago,Ill. U5, W14	7.95
SparrowsPoint,Md. B2	7.95
Sterling,Ill. N15	7.625
Warren,O. R2	7.95
Youngstown U5, Y1	7.95

PLATES, Alloy

Aliquippa,Pa. J5	7.50
Claymont,Del. P4	7.50
Coatesville,Pa. L7	7.50
Economy,Pa. B14	7.50
Farrell,Pa. S3	7.50
Fontana,Calif. K1	8.30
Gary,Ind. U5	7.50
Houston S5	7.60
Ind.Harbor,Ind. Y1	7.50
Johnstown,Pa. B2	7.50
Lowellville,O. S3	7.50
Munhall,Pa. U5	7.50
Newport,Ky. A2	7.50
Pittsburgh J5	7.50
Seattle B3	8.40
Sharon,Pa. S3	7.50
S.Chicago,Ill. U5, W14	7.50
SparrowsPoint,Md. B2	7.50
Youngstown Y1	7.50

FLOOR PLATES

Cleveland J5	6.375
Conshohocken,Pa. A3	6.375
Harrisburg,Pa. P4	6.375
Ind.Harbor,Ind. I-2	6.375
Munhall,Pa. U5	6.375
Pittsburgh J5	6.375
S.Chicago,Ill. U5	6.375

PLATES, Ingot Iron

Ashland c.l.(15) A10	5.55
Ashland l.c.l.(15) A10	6.05
Cleveland c.l. R2	6.05
Warren,O. R2	6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2	5.675
Aliquippa,Pa.(9) J5	5.675
Alton,Ill. L1	5.875
Atlanta(9) A11	5.875
Bessemer,Ala.(9) T2	5.675
Birmingham(9) C15	5.675
Buffalo(9) R2	5.675
Canton,O.(23) R2	6.15
Clairton,Pa.(9) U5	5.675
Cleveland(9) R2	5.675
Ecorse,Mich.(9) G5	5.675
Emeryville,Calif. J7	6.425
Fairfield,Ala.(9) T2	5.675
Fairless,Pa.(9) U5	5.825
Fontana,Calif.(9) K1	6.375
Gary,Ind.(9) U5	5.675
Houston(9) S5	5.925
Ind.Harbor(9) I-2, Y1	5.675
Johnstown,Pa.(9) B2	5.675
Joliet,Ill. P2	5.675
KansasCity,Mo.(9) S5	5.925
Lackawanna(9) B2	5.675
LosAngeles(9) B3	6.375
Massillon,O.(23) R2	6.15
Midland,Pa.(23) C18	6.025
Milton,Pa. M18	5.825
Minnequa,Colo. C10	6.125
Niles,Calif. P1	6.375
Owensboro,Ky.(9) G8	6.025
Pittsburg,Calif.(9) C11	6.375
Pittsburgh(9) J5	5.675
Portland,Oreg. O4	6.425
Riverdale,Ill.(9) A1	5.675
Seattle(9) A24,B3,N15	6.425
S.Ch'c'go(9)R2,U5,W14	5.675
S.Duquesne,Pa.(9) U5	5.675
S.SanFran.,Calif.(9)B3	6.425
Sterling,Ill.(1)(9) N15	5.675
Sterling,Ill.(9) N15	5.775
Struthers,O.(9) Y1	5.675
Tonawanda,N.Y. B12	5.675
Torrance,Calif.(9) C11	6.375
Warren,O. C17	6.025
Youngstown(9) R2,U5	5.675

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5	6.725
Bethlehem,Pa. B2	6.725
Bridgeport,Conn. C32	6.80
Buffalo R2	6.725
Canton,O. R2, T7	6.725
Clairton,Pa. U5	6.725
Detroit S41	6.725
Economy,Pa. B14	6.725
Ecorse,Mich. G5	6.725
Farrell,Pa. S3	6.725
Fontana,Calif. K1	7.775
Gary,Ind. U5	6.725
Houston S5	6.975
Ind.Harbor,Ind. I-2, Y1	6.725
Johnstown,Pa. B2	6.725
KansasCity,Mo. S5	6.975
Lackawanna,N.Y. B2	6.725
LosAngeles B3	7.775
Lowellville,O. S3	6.725
Massillon,O. R2	6.725
Midland,Pa. C18	6.725
Owensboro,Ky. G8	6.725
Pittsburgh J5	6.725
Seattle(6) B3	7.825
Sharon,Pa. S3	6.725
S.Chicago R2, U5, W14	6.725
S.Duquesne,Pa. U5	6.725
Struthers,O. Y1	6.725
Warren,O. C17	6.725
Youngstown U5	6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy

Aliquippa,Pa. J5	8.30
Bessemer,Ala. T2	8.30
Bethlehem,Pa. B2	8.30
Clairton,Pa. U5	8.30
Cleveland R2	8.30
Ecorse,Mich. G5	8.30
Fairfield,Ala. T2	8.30
Fontana,Calif. K1	9.00
Gary,Ind. U5	8.30
Houston S5	8.55
Ind.Harbor,Ind. Y1	8.30
Johnstown,Pa. B2	8.30
KansasCity,Mo. S5	8.55
Lackawanna,N.Y. B2	8.30
LosAngeles B3	9.00
Pittsburgh J5	8.30
Seattle B3	9.05
S.Chicago,Ill. R2, W14	8.30
S.Duquesne,Pa. U5	8.30
S.SanFrancisco B3	9.05
Sterling,Ill. N15	7.925
Struthers,O. Y1	8.30
Youngstown U5	8.30

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2	5.825
Houston(9) S5	5.925
KansasCity,Mo.(9) S5	5.925
Lackawanna(9) B2	5.675
Sterling,Ill. N15	5.775
Sterling,Ill.(1) N15	5.675
Tonawanda,N.Y. B12	5.675

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5	5.675
Atlanta A11	5.875
Joliet,Ill. P22	5.675
Minnequa,Colo. C10	6.125
Niles,Calif. P1	6.375
Pittsburgh J5	5.675
Portland,Oreg. O4	6.425
SanFrancisco S7	6.52
Seattle B3	6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron

Economy,Pa. B14	16.45

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5	6.80
Clairton,Pa. U5	6.80
Gary,Ind. U5	6.80
Houston S5	7.05
KansasCity,Mo. S5	7.05
Pittsburgh J5	6.80
Youngstown U5	6.80

BARS, C.F. Leaded (Including leaded extra)

Carbon

LosAngeles P2, S30	11.75*

Alloy

Ambridge,Pa. W18	10.175
BeaverFall,Pa. M12	10.175
Camden,N.J. P13	10.35
Chicago W18	10.175
Elyria,O. W8	10.175
Monaca,Pa. S17	10.175
Newark,N. J. W18	10.35
SpringCity,Pa. K3	10.35

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*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon

Ambridge,Pa. W18	7.65
BeaverFalls,Pa. M12,R2	7.65
Birmingham C15	8.25
Buffalo B5	7.70
Camden,N.J. P13	8.10
Carnegie,Pa. C12	7.65
Chicago W18	7.65
Cleveland A7, C20	7.65
Detroit B5, P17	7.85
Detroit S41	7.65
Donora,Pa. A7	7.65
Elyria,O. W8	7.65
FranklinPark,Ill. N5	7.65
Gary,Ind. R2	7.65
GreenBay,Wis. F7	7.65
Hammond,Ind. J5, L2	7.65
Hartford,Conn. R2	8.15
Harvey,Ill. B5	7.65
LosAngeles(49) S30	9.10
LosAngeles(49) P2, R2	9.10
Mansfield,Mass. B5	8.20
Massillon,O. R2, R8	7.65
Midland,Pa. C18	7.65
Monaca, Pa. S17	7.65
Newark,N.J. W18	8.10
NewCastle,Pa.(17) B4	7.65
Pittsburgh J5	7.65
Plymouth,Mich. P5	7.90
Putnam,Conn. W18	8.20
Readville,Mass. C14	8.20
Seattle(49) S30	9.10
S.Chicago,Ill. W14	7.65
SpringCity,Pa. K3	8.10
Struthers,O. Y1	7.65
Warren,O. C17	7.65
Waukegan,Ill. A7	7.65
Willimantic,Conn. J5	8.15
Youngstown F3, Y1	7.65

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19	6.55

BARS, Cold-Finished Alloy

Ambridge,Pa. W18	9.025
BeaverFalls,Pa.M12,R2	9.025
Bethlehem,Pa. B2	9.025
Bridgeport,Conn. C32	9.175
Buffalo B5	9.025
Camden,N.J. P13	9.20
Canton,O. T7	9.025
Carnegie,Pa. C12	9.025
Chicago W18	9.025
Cleveland A7, C20	9.025
Detroit B5, P17	9.225
Detroit S41	9.025
Donora,Pa. A7	9.025
Elyria,O. W8	9.025
FranklinPark,Ill. N5	9.025
Gary,Ind. R2	9.025
GreenBay,Wis. F7	9.025
Hammond,Ind. J5, L2	9.025
Hartford,Conn. R2	9.325
Harvey,Ill. R5	9.025
Lackawanna,N.Y. B3	9.025
LosAngelesP2, S30	11.00
Mansfield,Mass. B5	9.325
Massillon,O. R2, R8	9.025
Midland,Pa. C18	9.025
Monaca,Pa. S17	9.025
Newark,N.J. W18	9.20
Plymouth,Mich. P5	9.225
S.Chicago,Ill. W14	9.025
SpringCity,Pa. K3	9.20

Struthers,O. Y1	9.025
Warren,O. C17	9.025
Waukegan,Ill. A7	9.025
Willimantic,Conn. J5	9.325
Worcester,Mass. A7	9.325
Youngstown F3, Y1	9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2	5.675
Atlanta A11	5.25
Birmingham C15	5.25
Buffalo R2	5.675
Cleveland R2	5.675
Ecorse,Mich. G5	5.675
Emeryville,Calif. J7	6.425
Fairfield,Ala. T2	5.675
Fairless,Pa. U5	5.825
Fontana,Calif. K1	6.375
Ft.Worth,Tex.(26) T4	5.50
Gary,Ind. U5	5.675
Houston S5	5.675
Ind.Harbor,Ind. I-2,Y1	5.675
Johnstown,Pa. B2	5.675
Joliet,Ill. P22	5.675
KansasCity,Mo. S5	5.675
Kokomo,Ind. C16	5.775
Lackawanna,N.Y. B2	5.675
LosAngeles B3	6.375
Madison,Ill. L1	5.875
Milton,Pa. M18	5.825
Minnequa,Colo. C10	6.125
Niles,Calif. P1	6.375
Pittsburg,Calif. C11	6.375
Pittsburgh J5	5.675
Portland,Oreg. O4	6.425
SandSprings,Okla. S5	5.675
Seattle A24, B3, N14	6.425
S.Chicago,Ill. R2, W14	5.675
S.Duquesne,Pa. U5	5.675
S.SanFrancisco B3	6.425
SparrowsPoint,Md. B2	5.675
Steelton,Pa. B2	5.675
Sterling,Ill.(1) N15	5.675
Sterling,Ill. N15	5.775
Struthers,O. Y1	5.675
Tonawanda,N.Y. B12	6.10
Torrance,Calif. C11	6.375
Youngstown R2, U5	5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2	7.42
Boston B2, U8	8.15
Chicago U8	7.41
Cleveland U8	7.39
Houston S5	7.35
Johnstown,Pa. B2	7.33
KansasCity,Mo. S5	7.35
Lackawanna,N.Y. B2	7.35
Marion,O. P11	6.70
Newark,N.J. U8	7.80
Philadelphia U8	7.63
Pittsburgh J5, U8	7.35
SandSprings,Okla. S5	7.35
Seattle A24, B3, N14	7.95
SparrowsPoint,Md. B2	7.33
St.Paul U8	8.17
Williamsport,Pa. S19	7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14	15.10
Economy,Pa.(D.R.)B14	19.30
Econ.(DirectRolled)B14	13.55
Economy(Staybolt)B14	19.80
McK.Rks.(S.R.) L5	14.50
McK.Rks.(D.R.)L5	19.80
McK.Rks.(Staybolt)L5	20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2	5.575
ChicagoHts.(4)(44) I-2	5.675
ChicagoHts.(4) C2	5.675
Franklin,Pa.(3) F5	5.575
Franklin,Pa.(4) F5	5.675
JerseyShore,Pa.(3) J8	5.55
Marion,O.(3) P11	5.575
Tonawanda(3) B12	5.575
Tonawanda(4) B12	6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2	5.10
Allenport,Pa. P7	5.10
Aliquippa,Pa. J5	5.10
Ashland,Ky.(8) A10	5.10
Cleveland J5, R2	5.10
Conshohocken,Pa. A3	5.15
Detroit(8) M1	5.10
Ecorse,Mich. G5	5.10
Fairfield,Ala. T2	5.10
Fairless,Pa. U5	5.15
Farrell,Pa. S3	5.10
Fontana,Calif. K1	5.825
Gary,Ind. U5	5.10
Geneva,Utah C11	5.20
GraniteCity,Ill.(8) G4	5.20
Ind.Harbor,Ind. I-2, Y1	5.10
Irvin,Pa. U5	5.10
Lackawanna,N.Y. B2	5.10
Mansfield,O. E6	5.10
Munhall,Pa. U5	5.10
Newport,Ky. A2	5.10
Niles,O. M21, S3	5.10
Pittsburg,Calif. C11	5.80
Pittsburgh J5	5.10
Portsmouth,O. P12	5.10
Riverdale,Ill. A1	5.10
Sharon,Pa. S3	5.10
S.Chicago,Ill. U5, W14	5.10
SparrowsPoint,Md. B2	5.10
Steubenvile,O. W10	5.10
Warren,O. R2	5.10
Weirton,W.Va. W6	5.10
Youngstown U5, Y1	5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3	6.275

SHEETS, H.R. Alloy

Gary,Ind. U5	8.40
Ind.Harbor,Ind. Y1	8.40
Irvin,Pa. U5	8.40
Munhall,Pa. U5	8.40
Newport,Ky. A2	8.40
Youngstown U5, Y1	8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5	7.525
Ashland,Ky. A10	7.525
Cleveland J5, R2	7.525
Conshohocken,Pa. A3	7.575
Ecorse,Mich. G5	7.525
Fairfield,Ala. T2	7.525
Fairless,Pa. U5	7.575
Farrell,Pa. S3	7.525
Fontana,Calif. K1	8.25
Gary,Ind. U5	7.525
Ind.Harbor,Ind. I-2, Y1	7.525
Irvin,Pa. U5	7.525
Lackawanna(35) B2	7.525
Munhall,Pa. U5	7.525
Niles,O. S3	7.525
Pittsburgh J5	7.525
S.Chicago,Ill. U5, W14	7.525
Sharon,Pa. S3	7.525
SparrowsPoint(36) B2	7.525
Warren,O. R2	7.525
Weirton,W.Va. W6	7.525
Youngstown U5, Y1	7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10	5.35
Cleveland R2	5.875
Warren,O. R2	5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2	7.05
Middletown,O. A10	6.775
Warren,O. R2	7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2	6.275
Aliquippa,Pa. J5	6.275
Allenport,Pa. P7	6.275
Cleveland J5, R2	6.275
Conshohocken,Pa. A3	6.325
Detroit M1	6.275
Ecorse,Mich. G5	6.275
Fairfield,Ala. T2	6.275
Fairless,Pa. U5	6.325
Follansbee,W.Va. F4	6.275
Fontana,Calif. K1	7.40
Gary,Ind. U5	6.275
GraniteCity,Ill. G4	6.375
Ind.Harbor,Ind. I-2, Y1	6.275
Irvin,Pa. U5	6.275
Lackawanna,N.Y. B2	6.275
Mansfield,O. E6	6.275
Middletown,O. A10	6.275
Newport,Ky. A2	6.275
Pittsburg,Calif. C11	7.225
Pittsburgh J5	6.275
Portsmouth,O. P12	6.275
SparrowsPoint,Md. B2	6.275
Steubenville,O. W10	6.275
Warren,O. R2	6.275
Weirton,W.Va. W6	6.275
Yorkville,O. W10	6.275
Youngstown Y1	6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5	9.275
Cleveland J5, R2	9.275
Ecorse,Mich. G5	9.275
Fairless,Pa. U5	9.325
Fontana,Calif. K1	10.40
Gary,Ind. U5	9.275
Ind.Harbor,Ind. I-2, Y1	9.275
Lackawanna(38) B2	9.275
Pittsburgh J5	9.275
SparrowsPoint(33) B2	9.275
Warren,O. R2	9.275
Weirton,W.Va. W6	9.275
Youngstown Y1	9.275

SHEETS, Culvert	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2	7.475

SHEETS, Enameling

Ashland,Ky. A10	6.775
Cleveland R2	6.775
Fairfield,Ala. T2	6.775
Gary,Ind. U5	6.775
Ind.Harbor,Ind. I-2, Y1	6.775
Irvin,Pa. U5	6.775
Middletown,O. A10	6.775
Niles,O. M21, S3	6.775
SparrowsPoint,Md. B2	6.775
Youngstown Y1	6.775

BLUED STOCK, 29 Gage

Dover,O. E6	8.70
Ind.Harbor,Ind. I-2	8.70
Mansfield,O. E6	8.70
Warren,O. R2	8.70
Yorkville,O. W10	8.70

SHEETS, Long Terne, Steel (Commercial Quality)

Follansbee,W.Va. W10	7.225
Gary,Ind. U5	7.225
Mansfield,O. E6	7.225
Middletown,O. A10	7.225
Niles,O. M21, S3	7.225
Warren,O. R2	7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1)	9.525
Butler,Pa. A10 (type 2)	9.625
Irvin,Pa. U5 (type 1)	9.525

SHEETS, Well Casing

Fontana,Calif. K1	7.325

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5	10.125
Pittsburgh J5	10.125
SparrowsPt.(39) B2	10.025

SHEETS, Galvannealed Steel

Canton,O. R2	7.275
Irvin,Pa. U5	7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10	7.125
Middletown,O. A10	7.125

SHEETS, Electrogalvanized

Cleveland(28) R2	7.65
Niles,O.(28) R2	7.65
Weirton,W.Va. W6	7.50

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2	6.875‡
Ashland,Ky. A10	6.875‡
Canton,O. R2	6.875‡
Dover,O. E6	6.875†
Fairfield,Ala. T2	6.875†
Gary,Ind. U5	6.875†
GraniteCity,Ill. G4	6.975*
Ind.Harbor,Ind. I-2	6.875†
Irvin,Pa. U5	6.875†
Kokomo,Ind. C16	6.975‡
MartinsFerry,O. W10	6.875*
Middletown,O. A10	6.875†
Pittsburg,Calif. C11	7.625*
Pittsburgh J5	6.875†
SparrowsPt.,Md. B2	6.875†
Warren,O. R2	6.875†
Weirton,W.Va. W6	6.875*

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*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

Key to Producers

A1	Acme Steel Co.
A2	Acme-Newport Steel Co.
A3	Alan Wood Steel Co.
A4	Allegheny Ludlum Steel
A5	Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6	American Shim Steel Co.
A7	American Steel & Wire Div., U. S. Steel Corp.
A8	Anchor Drawn Steel Co.
A9	Angell Nail & Chaplet
A10	Armco Steel Corp.
A11	Atlantic Steel Co.
A24	Alaska Steel Mills Inc.
A25	Algoma Steel Corp. Ltd.
B1	Babcock & Wilcox
B2	Bethlehem Steel Co.
B3	Bethlehem Steel Co., Pacific Coast Div.
B4	Blair Strip Steel Co.
B5	Bliss & Laughlin Inc.
B8	Braeburn Alloy Steel
B9	Brainard Steel Div., Sharon Steel Corp.
B10	E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12	Buffalo Steel Corp.
B14	A. M. Byers Co.
B15	J. Bishop & Co.
C1	Calstrip Steel Corp.
C2	Calumet Steel Div., Borg-Warner Corp.
C4	Carpenter Steel Co.
C9	Colonial Steel Co.
C10	Colorado Fuel & Iron
C11	Columbia-Geneva Steel
C12	Columbia Steel & Shaft.
C13	Columbia Tool Steel Co.
C14	Compressed Steel Shaft.
C15	Connors Steel Div., H. K. Porter Co., Inc.
C16	Continental Steel Corp.
C17	Copperweld Steel Co.
C18	Crucible Steel Co.
C19	Cumberland Steel Co.
C20	Cuyahoga Steel & Wire
C23	Charter Wire Inc.
C24	G. O. Carlson Inc.
C32	Carpenter Steel of N.Eng.
D2	Detroit Steel Corp.
D4	Disston Div., H. K. Porter Co. Inc.
D6	Driver-Harris Co.
D7	Dickson Weatherproof Nail Co.
D8	Damascus Tube Co.
D9	Wilbur B. Driver Co.
E1	Eastern Gas&Fuel Assoc.
E2	Eastern Stainless Steel
E6	Empire-Reeves Steel
E10	Enamel Prod. & Plating
F2	Firth Sterling Inc.
F3	Fitzsimmons Steel Co.
F4	Follansbee Steel Corp.
F5	Franklin Steel Div., Borg-Warner Corp.
F6	Fretz-Moon Tube Co.
F7	Ft. Howard Steel & Wire
F8	Ft. Wayne Metals Inc.
G4	Granite City Steel Co.
G5	Great Lakes Steel Corp.
G6	Greer Steel Co.
G8	Green River Steel Corp.
H1	Hanna Furnace Corp.
H7	Helical Tube Co.
I-1	Igoe Bros. Inc.
I-2	Inland Steel Co.
I-3	Interlake Iron Corp.
I-4	Ingersoll Steel Div., Borg-Warner Corp.
I-6	Ivins Steel Tube Works
I-7	Indiana Steel & Wire Co.
J1	Jackson Iron & Steel Co.
J3	Jessop Steel Co.
J4	Johnson Steel & Wire Co.
J5	Jones & Laughlin Steel
J6	Joslyn Mfg. & Supply
J7	Judson Steel Corp.
J8	Jersey Shore Steel Co.
K1	Kaiser Steel Corp.
K2	Keokuk Electro-Metals
K3	Keystone Drawn Steel
K4	Keystone Steel & Wire
K7	Kenmore Metals Corp.
L1	Laclede Steel Co.
L2	LaSalle Steel Co.
L3	Latrobe Steel Co.
L6	Lone Star Steel Co.
L7	Lukens Steel Co.
L8	Leschen Wire Rope Div., H. K. Porter Co. Inc.
M1	McLouth Steel Corp.
M4	Mahoning Valley Steel
M6	Mercer Pipe Div., Sawhill Tubular Products
M8	Mid-States Steel & Wire
M12	Moltrup Steel Products
M14	McInnes Steel Co.
M16	Md. Fine & Specialty Wire Co. Inc.
M17	Metal Forming Corp.
M18	Milton Steel Div., Merritt-Chapman&Scott
M21	Mallory-Sharon Metals Corp.
M22	Mill Strip Products Co.
M23	Mill Strip Products Co. of Pennsylvania
N1	National-Standard Co.
N2	National Supply Co.
N3	National Tube Div., U. S. Steel Corp.
N5	Nelsen Steel & Wire Co.
N6	New England High Carbon Wire Co.
N8	Newman-Crosby Steel
N14	Northwest. Steel Rolling Mills Inc.
N15	Northwestern S.&W. Co.
N20	Neville Ferro Alloy Co.
O4	Oregon Steel Mills
P1	Pacific States Steel Corp.
P2	Pacific Tube Co.
P4	Phoenix Steel Corp.
P5	Pilgrim Drawn Steel
P6	Pittsburgh Coke & Chem.
P7	Pittsburgh Steel Co.
P11	Pollak Steel Co.
P12	Portsmouth Div., Detroit Steel Corp.
P13	Precision Drawn Steel
P15	Pittsburgh Metallurgical
P16	Page Steel & Wire Div., American Chain & Cable
P17	Plymouth Steel Corp.
P19	Pitts. Rolling Mills
P20	Prod. Steel Strip Corp.
P22	Phoenix Mfg. Co.
P24	Phil. Steel & Wire Corp.
R2	Republic Steel Corp.
R3	Rhode Island Steel Corp.
R5	Roebling's Sons, John A.
R6	Rome Strip Steel Co.
R8	Reliance Div., EatonMfg.
R9	Rome Mfg. Co.
R10	Rodney Metals Inc.
S1	Seneca Wire & Mfg. Co.
S3	Sharon Steel Corp.
S4	Sharon Tube Co.
S5	Sheffield Div., Armco Steel Corp.
S6	Shenango Furnace Co.
S7	Simmons Co.
S8	Simonds Saw & Steel Co.
S12	Spencer Wire Corp.
S13	Standard Forgings Corp.
S14	Standard Tube Co.
S15	Stanley Works
S17	Superior Drawn Steel Co.
S18	Superior Steel Div., Copperweld Steel Co.
S19	Sweet's Steel Co.
S20	Southern States Steel
S23	Superior Tube Co.
S25	Stainless Welded Prod.
S26	Specialty Wire Co. Inc.
S30	Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40	Seneca Steel Service
S41	Stainless & Strip Div., J & L Steel Corp.
S42	Southern Elec. Steel Co.
S43	Seymour Mfg. Co.
S44	Screw & Bolt Corp. of America
S45	Somers Brass Co.
S46	Steel Co. of Canada
T2	Tenn. Coal & Iron Div., U. S. Steel Corp.
T3	Tenn. Products & Chemical Corp.
T4	Texas Steel Co.
T5	Thomas Strip Div., Pittsburgh Steel Co.
T6	Thompson Wire Co.
T7	Timken Roller Bearing
T9	Tonawanda Iron Div., Am. Rad. & Stan. San.
T13	Tube Methods Inc.
T19	Techalloy Co. Inc.
U3	Union Wire Rope Corp.
U4	Universal-Cyclops Steel
U5	U. S. Steel Corp.
U6	U. S. Pipe & Foundry
U7	Ulbrich Stainless Steels
U8	U. S. Steel Supply Div., U. S. Steel Corp.
U11	Union Carbide Metals Co.
U13	Union Steel Corp.
V2	Vanadium-Alloy Steel
V3	Vulcan-Kidd Steel Div., H. K. Porter Co.
W1	Wallace Barnes Steel Div., Associated Spring
W2	Wallingford Steel Co.
W3	Washburn Wire Co.
W4	Washington Steel Corp.
W6	Weirton Steel Co.
W8	Western Automatic Machine Screw Co.
W9	Wheatland Tube Co.
W10	Wheeling Steel Corp.
W12	Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13	Wilson Steel & Wire Co.
W14	Wisconsin Steel Div., International Harvester
W15	Woodward Iron Co.
W18	Wyckoff Steel Co.
Y1	Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	5.10
Allenport,Pa. P7	5.10
Alton,Ill. L1	5.30
Ashland,Ky.(8) A10	5.10
Atlanta A11	5.10
Bessemer,Ala. T2	5.10
Birmingham C15	5.10
Conshohocken,Pa. A3	5.15
Detroit M1	5.10
Ecorse,Mich. G5	5.10
Fairfield,Ala. T2	5.10
Farrell,Pa. S3	5.10
Fontana,Calif. K1	5.825
Gary,Ind. U5	5.10
Ind.Harbor,Ind. I-2, Y1	5.10
Johnstown,Pa.(25) B2	5.10
Lackaw'na,N.Y.(25) B2	5.10
LosAngeles(25) B3	5.85
LosAngeles C1	8.60
Minnequa,Colo. C10	6.20
Riverdale,Ill. A1	5.10
SanFrancisco S7	6.60
Seattle(25) B3	6.10
Seattle N14	6.60
Sharon,Pa. S3	5.10
S.Chicago,Ill. W14	5.10
S.SanFrancisco(25) B3	5.85
SparrowsPoint,Md. B2	5.10
Torrance,Calif. C11	5.85
Warren,O. R2	5.10
Weirton,W.Va. W6	5.10
Youngstown U5	5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.40
Farrell,Pa. S3	8.40
Gary,Ind. U5	8.40
Houston S5	8.65
Ind.Harbor,Ind. Y1	8.40
KansasCity,Mo. S5	8.65
LosAngeles B3	9.60
Lowellville,O. S3	8.40
Newport,Ky. A2	8.40
Sharon,Pa. A2, S3	8.40
S.Chicago,Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10	7.575
Bessemer,Ala. T2	7.575
Conshohocken,Pa. A3	7.575
Ecorse,Mich. G5	7.575
Fairfield,Ala. T2	7.575
Farrell,Pa. S3	7.575
Gary,Ind. U5	7.575
Ind.Harbor,Ind. I-2,Y1	7.575
Lackawanna,N.Y. B2	7.575
LosAngeles(25) B3	8.325
Seattle(25) B3	8.575
Sharon,Pa. S3	7.575
S.Chicago,Ill. W14	7.575
S.SanFrancisco(25) B3	8.325
SparrowsPoint,Md. B2	7.575
Warren,O. R2	7.575
Weirton,W.Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.35
Warren,O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7, J5	7.425
Dearborn,Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover,O. G6	7.425
Evanston,Ill. M22	7.525
Farrell,Pa. S3	7.425
Follansbee,W.Va. W10	7.425
Fontana,Calif. K1	9.20
FranklinPark,Ill. T6	7.525
Ind.Harbor,Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport,Pa. E10	7.525
NewBedford,Mass. R10	7.875
NewBritain,Conn. S15	7.875
NewCastle,Pa. B4, M23	7.425
NewHaven,Conn. D2	7.875
NewKensington,Pa. A6	7.425
Pawtucket,R.I. R3, N8	7.975
Philadelphia P24	7.875
Pittsburgh J5	7.425
Riverdale,Ill. A1	7.525
Rome,N.Y.(32) R6	7.425
Sharon,Pa. S3	7.425
Trenton,N.J.(31) R5	8.875
Warren,O. R2, T5	7.425
Worcester,Mass. A7	7.975

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Cleveland A7	15.55
Carnegie,Pa. S18	15.55
Dover,O. G6	15.55
Farrell,Pa. S3	15.55
FranklinPark,Ill. T6	15.55
Harrison,N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville,O. S3	15.55
Pawtucket,R.I. N8	15.90
Riverdale,Ill. A1	15.55
Sharon,Pa. S3	15.55
Worcester,Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn,Mich. S3	10.80
Dover,O. G6	10.80
Farrell,Pa. S3	10.80
Ind.Harbor,Ind.Y1	10.80
Sharon,Pa. S3	10.80
Warren,O. R2	10.80
Weirton,W.Va. W6	10.80
Youngstown Y1	10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3	7.50
Sharon,Pa. S3	7.50

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7 T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	...	...	18.85	22.95	27.80
Buffalo W12	...	...	18.85	....	....
Fostoria,O. S1	...	...	19.05	22.15	....
FranklinPark,Ill. T6	...	...	19.20	23.30	28.15
Harrison,N.J. C18	...	...	18.85	22.95	27.80
NewYork W3	...	...	18.85	22.95	27.80
Palmer,Mass. W12	...	...	18.85	....	....
Trenton,N.J. R5	...	...	18.85	22.95	27.80
Worcester,Mass. A7, T6	...	...	18.85	22.95	27.80
Youngstown S41	...	...	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7	7.425*
Dover,O. G6	7.425*
Evanston,Ill. M22	7.525*
McKeesport,Pa. E10	7.50*
NewCastle,Pa. M23	7.425*
Riverdale,Ill. A1	7.525*
Warren,O. B9, S3, T5	7.425*
Worcester,Mass. A7	7.975
Youngstown S41, Y1	7.425*

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*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	8.175

TIGHT COOPERAGE HOOP

Atlanta A11	5.825
Farrell,Pa. S3	5.525
Riverdale,Ill. A1	5.675
Sharon,Pa. S3	5.525
Youngstown U5	5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Base Box			
	45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.20	$6.35	$6.50	$6.65
Fairless,Pa. U5	6.20	6.35	6.50	6.65
Gary,Ind. U5	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55

TIN PLATE, Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.30
Fairless,Pa. U5	8.30
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented					
	T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

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*Semiprocessed. †Fully processed only. ‡Coil, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	8.00
Aliquippa,Pa. J5	8.00
Alton,Ill. L1	8.20
Atlanta A1	8.00
Bartonville,Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville,Ind. M8	8.10
Donora,Pa. A7	8.00
Duluth A7	8.00
Fairfield,Ala. T2	8.00
Fostoria,O.(24) S1	8.10
Houston S5	8.25
Jacksonville,Fla. M8	8.35
Johnstown,Pa. B2	8.00
Joliet,Ill. A7	8.00
KansasCity,Mo. S5	8.25
Kokomo,Ind. C16	8.10
LosAngeles B3	8.95
Minnequa,Colo. C10	8.25
Monessen,Pa. P7, P16	8.00
Palmer,Mass. W12	8.30
Pittsburg,Calif. C11	8.95
Portsmouth,O. P12	8.00
Rankin,Pa. A7	8.00
S.Chicago,Ill. R2	8.00
S.SanFrancisco C10	8.95
SparrowsPoint,Md. B2	8.10
Sterling,Ill.(1) N15	8.00
Sterling,Ill. N15	8.10
Struthers,O. Y1	8.00
Waukegan,Ill. A7	8.00
Worcester,Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria,O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa. B2	13.40
KansasCity,Mo. U3	12.90
Minnequa,Colo. C10	12.775
Monessen,Pa. P7, P16	12.65
Muncie,Ind. I-7	13.60
NewHaven,Conn. A7	12.95
Palmer,Mass. W12	13.70
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling,N.J. R5	12.95
SparrowsPt.,Md. B2	13.50
Struthers,O. Y1	13.40
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
Kokomo,Ind. C16	9.85
LosAngeles B3	10.70
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
NewHaven,Conn. A7	10.05
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.70
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Worcester,Mass. A7	10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Bartonville,Ill. K4	9.85
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Fostoria,O. S1	9.80
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
LosAngeles B3	10.70
Milbury,Mass.(12) N6	10.05
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
Muncie,Ind. I-7	9.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.70
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Wor'ster,Mass.A7,J4,T6	10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	16.50
Bartonville,Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville,Ind. M8	16.40
Fostoria,O. S1	16.30
Houston S5	16.55
Jacksonville,Fla. M8	16.65
Johnstown,Pa. B2	16.30
KansasCity,Mo. S5	16.55
Kokomo,Ind. C16	16.30
Minnequa,Colo. C16	16.55
Monessen,Pa. P16	16.30
Muncie,Ind. I-7	16.50
Palmer,Mass. W12	16.60
S.SanFrancisco C10	17.15
Waukegan,Ill. A7	16.30
Worcester,Mass. A7, J4	16.60

ROPE WIRE	(A)
Partonville,Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S1	13.45
Johnstown,Pa. B2	13.45
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer,Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling,N.J. R5	13.75
St.Louis L8	13.45
SparrowsPt.,Md. B2	13.55
Struthers,O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

OHIO Special Quality Tubing makes muscles that never tire

Strength, weight and cost advantages of OHIO Special Quality Tubing make it ideal for use in materials handling equipment — the modern lift trucks, belt and roller conveyor systems that provide the heft and muscle to move materials.

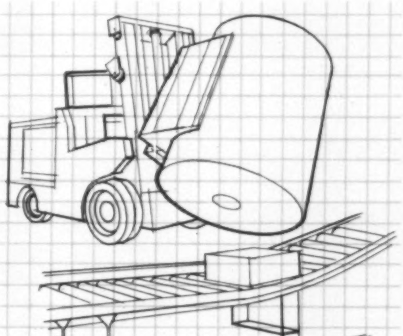
You can strengthen your product, too, if you weigh these important facts. OHIO Tubing is always the exact tubing you need because OHIO Tubing is CUSTOM MADE for your product. Your order is manufactured to your own specifications to produce steel tubing especially for your application — the precise grade, analysis, size, shape, special anneal and tolerances best suited to your needs.

Ohio Seamless Tube produces both seamless and electric welded steel tubing — is prepared to form many finished or semi-finished tubular parts to your designs.

To get the most from your next steel tubing order, specify OHIO Special Quality Tubing. Contact your nearest Ohio Seamless representative, or send part drawings to the plant at Shelby, Ohio — Birthplace of the Seamless Steel Tube Industry in America.

A-3281A

Model illustrated built to 3.5 mm scale.



OHIO

OHIO SEAMLESS TUBE

Division of Copperweld Steel Company • **SHELBY, OHIO**

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

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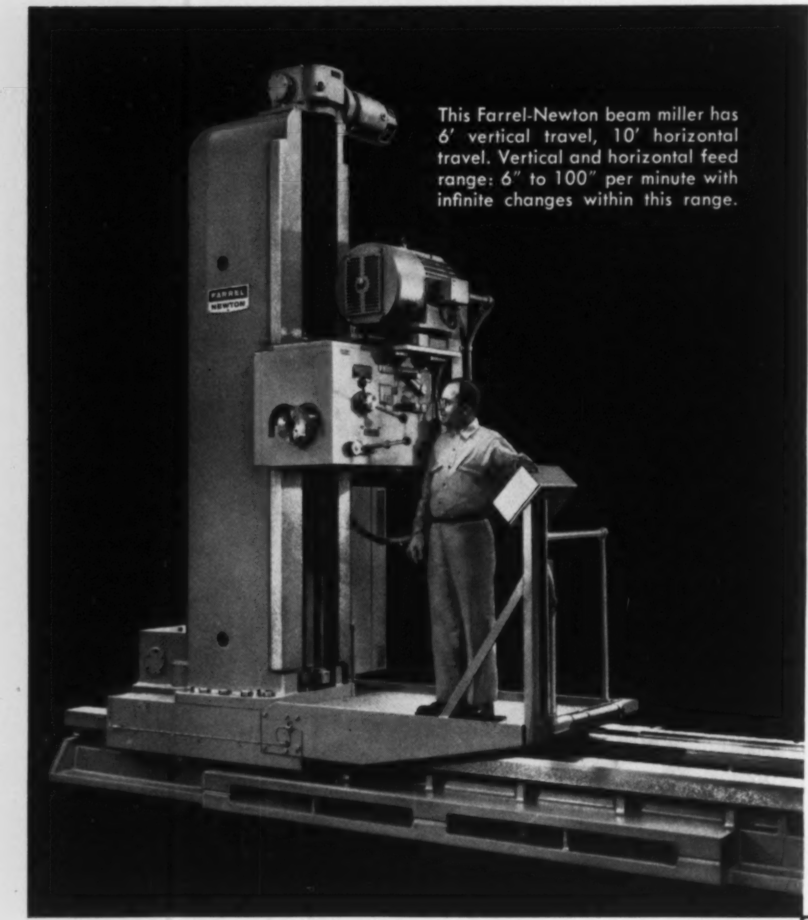
CANADA: Railway & Power Engr. Corp., Ltd. EXPORT: Copperweld Steel International Company, 225 Broadway, New York 7, New York

For milling the ends of structural beams . . . a line of versatile milling machines



This Farrel-Newton beam miller has 6′ vertical travel, 10′ horizontal travel. Vertical and horizontal feed range: 6″ to 100″ per minute with infinite changes within this range.

Designed primarily for the end milling of structural beams, Farrel-Newton beam millers range in capacities of vertical travel from 4′ to 12′ and horizontal travel from 8′ to 60′. Because of the diversity of work size encountered, the machines come furnished with a four-speed head.

They are also equipped with horizontal rack and pinion feed with both ends of the bed finish machined. Result: horizontal feed length can be increased as required in the field by adding bed and rack sections.

Proven through years of field experience, these millers are equipped with electronic feed for trouble-free production under the most punishing conditions. They are not vulnerable to temperature fluctuations nor moisture encountered in open-shop operation.

Consult Consolidated when next you need a beam milling machine.

FARREL-BIRMINGHAM COMPANY, INC.
CONSOLIDATED MACHINE TOOL DIVISION
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Telephone: BUtler 8-4600
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Buffalo and Rochester, N. Y.

CM-56

CONSOLIDATED ALSO BUILDS Engine Lathes • Roll Lathes • Vertical Boring and Turning Mills • Floor and Planer-type Horizontals • Planers, Double Housing and Openside • Planer-type Milling Machines • Plate-edge Planers and Millers • Vertical Slotters • Rotary and Straightline Production-type Milling Machines • Skin Mills and Cavity Mills for Aircraft Manufacturing • Circular Cold Saws • Railroad Wheel and Axle Machinery • Drill Grinders • Special Machine Tools

FARREL
NEWTON
®

WIRE, Tire Bead	
Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat	
Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock Sizes	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179
(To Wholesalers: per cwt)	
Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)	
Wheeling,W.Va. W10	$10.10

POLISHED STAPLES	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box)

Coil No. 3150	
AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.	
AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim	
AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
All'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WOVEN FENCE, 9-15 Ga.	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality (6 to 8 gage)	An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.00	9.75*
Bartonville(48)K4	9.85	19.90
Buffalo W12	9.00	9.55†
Chicago W13	9.00	9.55**
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55†
Houston(48) S5	9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85

7/16 in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws: ⅜ in. and smaller, 6 in. and shorter:

Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:	
Packaged	+ 5
Bulk	19
Through 1 in. diam., longer than 6 in.:	
Packaged	+29

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES	
Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7 025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS	
Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES	
Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES	
Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated	
Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES	
Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2¼ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

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*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling—		Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
	Ingot	Slabs							
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Sweepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	—Plates— Carbon Base				Sheets Carbon Base
	5%	10%	15%	20%	20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.35	43.40

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*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip. Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%)					AISI Designation	$ per lb
W	Cr	V	Co	Mo		
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N.Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S.Chicago R2	66.00	66.50	66.50	67.00
S.Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio. deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
NevilleIsland, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W.Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malleable	Bessemer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
SaultSte.Marie, Ont. A25	65.00	65.00	65.50	66.00

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*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
PortColborne, Ont. A25	78.50

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
NevilleIsland, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max).	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS				STRIP	BARS				PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	STRUCTURAL SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	7.77	8.66	10.06	....	8.28	8.55	11.70	16.38	9.03	8.34	10.02
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.05
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.65	9.80	11.25	55.98	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	9.87	11.22	10.30	....	10.86	9.67	12.68	....	9.88	9.82	11.46
Chicago	8.57	10.20	10.15	52.00	10.74	8.55	10.65	15.95	8.91	8.41	10.68
Cincinnati	8.74	10.26	10.20	65.30	11.06	8.87	11.53	16.27	9.47	8.79	11.01
Cleveland	8.57	9.88	11.24	56.18	10.86	8.66	11.25	16.06	9.30	8.65	10.92
Dallas	9.62	10.05	12.59	....	11.18	9.03	12.98	16.95	9.26	9.35	11.00
Detroit	8.83	10.46	10.50	52.00	11.11	8.86	11.01	16.23	9.47	8.78	10.94
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	9.65	12.19	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.60
Indianapolis	9.01	10.64	10.59	....	11.18	8.99	11.09	16.39	9.35	8.85	11.12
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	8.95	11.20	11.45	61.27	10.65	9.00	14.20	17.35	9.90	8.40	11.15
Memphis, Tenn.	9.84	10.05	....	....	10.64	9.82	12.74	....	9.16	8.66	11.41
Milwaukee	8.71	10.34	10.29	....	10.88	8.69	10.89	16.09	9.13	8.55	10.82
Moline, Ill.	8.92	10.55	10.50	....	10.90	8.90	11.15	16.45	9.26	8.76	10.96
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	8.35	9.60	10.66	52.71	10.35	8.75	11.95	16.38	8.95	8.70	9.95
Pittsburgh	8.57	9.88	11.13	52.00	10.84	8.55	11.25	15.95	8.91	8.41	10.68
Portland, Oreg.	9.45	11.30	12.35	....	11.45	9.45	16.65	17.80	10.05	9.60	11.75
St. Louis	8.77	10.58	10.53	....	10.94	8.77	11.28	16.33	9.14	8.62	10.91
St. Paul	8.84	9.59	10.84	....	11.01	8.82	11.49	16.54	9.18	8.68	10.44
San Francisco	10.17	11.69	11.40	54.00	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	10.51	11.57	12.50	54.02	11.95	9.94	16.20	17.80	10.65	10.10	12.73
Spokane, Wash.	10.36	11.42	12.35	54.02	11.80	9.79	16.20	17.80	10.50	9.95	12.58

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. & 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ⅝ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅜ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $146; Cutler. Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

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*—9 in. x 4½ x 2.50 straights.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

——Inches——		Per
Diam	Length	100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

Diam	Length	Per 100 lb
8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted.)

Billets, Blooms & Slabs:	
Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe.	36.75, ton, del. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron:	
90-99.9%, 3 to 20 microns, depending on grade,	88.00-700.00 in standard 200-lb containers; all minus 200 mesh.
Aluminum:	
Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	37.60
Bronze powder, 90/10	55.20
Copper, all types	15.25*
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types	0.78-1.06
Nickel-Silver	58.80
Solder	8.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	24.70
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten	nom.
Molybdenum	4.35

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*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes*	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.42	....	$5.32	$5.17	$5.52
Bar Size Angles	5.55	....	5.45	5.30	5.65
Structural Angles	5.45	....	5.35	5.20	5.55
I-Beams	5.45	....	5.35	5.20	5.55
Channels	5.45	....	5.35	5.20	5.55
Plates (basic bessemer)	5.70	....	5.60	5.45	5.80
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.50	....	24.70	24.70	25.50
Barbed Wire (†)	6.25	....	6.15	6.00	6.35
Merchant Bars	5.55	....	5.45	5.30	5.65
Hot-Rolled Bands	5.85	....	5.75	5.60	5.95
Wire Rods, Thomas Commercial No. 5	6.05	....	5.95	5.95	6.25
Wire Rods, O. H., No. 5	6.25	....	6.15	6.15	6.45
Bright Common Wire Nails (§)	6.85	....	6.75	6.60	6.95

*Book closed for 1960-61 shipping season. †Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Lump ½ in. and up	12.85
Fines, under ½ in.	10.72
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates	nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	23.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian, 68.5% f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.75-20.00*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-58%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charlestown, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75†
48% no ratio	24.00-26.00†

Turkish

48% 3:1	36.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.50-2.80
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

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*Before duty. †Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Everett, Mass., ovens:	
New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

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*Within $5.25 freight zone from works.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per net ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa. 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 50-56%, C 6-8%, Si 4-7%, 22.00c; Cr 58-63%, C 5.8%, Si 3-6%, 22.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 53-63%, C 3-5%, Si 2.5% max, 26.00c per lb of contained Cr, delivered in carlots, lump, bulk.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 33.50c per lb contained Cr; 0.010% max, 34.50c. Delivered.

Cr, 65-71%, carload, lump, bulk, 0.025% max, 35.00c; 0.05% max, 34.00c; 0.10% max, 33.75c; 0.20% max, 33.50c; 0.50% max, 33.25c; 1.0% max, 33.00c; 1.5% max, 32.75c; 2.0% max, 32.50c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.05c per lb of alloy carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 24.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 24.50c per lb contained Cr, 14.60c per lb contained Si; 0.75 in. x down, 26.25c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contianed B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETED ALLOYS

Chromium Briquets: (Weighing approx 3⅜ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb, (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-77% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20% per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

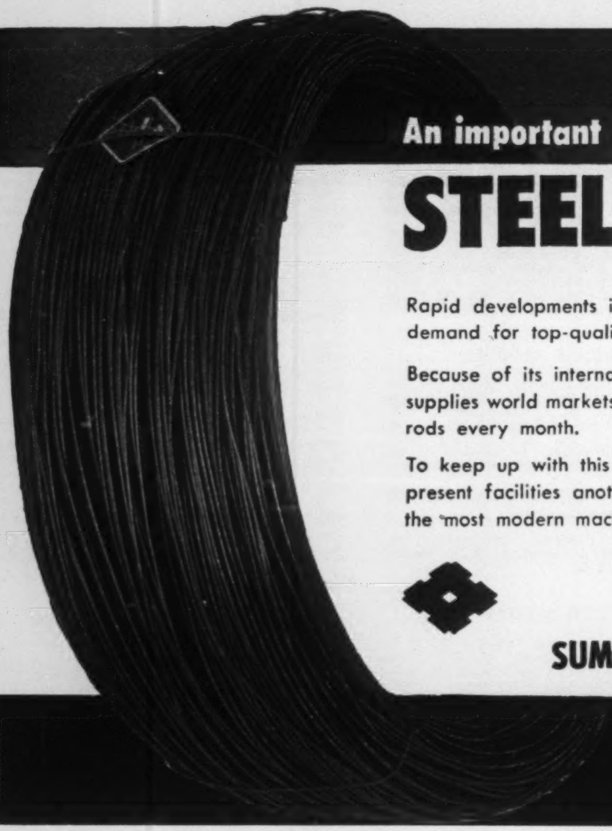
V-5 Founary Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.



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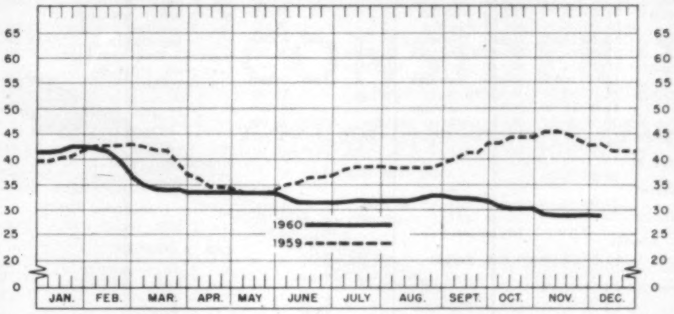
STEELMAKING SCRAP PRICE COMPOSITE

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania—Compiled by STEEL



Dec. 7 1960	Week Ago	Month Ago	Year Ago	Nov. Avg.
$28.67	**$28.83**	**$28.83**	**$42.83**	**$28.83**

Japanese Scrap Purchases Heavier

Larger tonnage requirements for first quarter strengthen market in the East. Domestic demand lags, and STEEL's composite price resumes downtrend

Scrap Prices, Page 130

• **Chicago** — A district mill announced $27 a gross ton as its December price for No. 1 industrial heavy melting steel. That's a drop of $1 from its November price. It should be pointed out, though, that the mill's purchases are limited to return scrap from customers on a selective basis. Another district mill has paid $30 for No. 1 factory bundles and $27 for No. 1 industrial heavy melting. Trading is in small tonnages, and the market lacks strength. No improvement is sighted for the remainder of this year; some slippage in the steelmaking rate seems certain.

• **Pittsburgh** — Recent mill purchases confirm quoted prices on dealer grades. Brokers for a steel producer on the edge of the district bought No. 1 heavy melting scrap at a price equivalent to $27 a ton, delivered locally (unchanged from last month's price). Another mill has been buying small quantities of No. 2 bundles at $21 a ton. Some observers look for a speculative upturn in railroad scrap.

• **Philadelphia** — Scrap sellers are encouraged by increased buying on Japanese account. Orders have been closed for 850,000 tons for shipment from this country in the first quarter. That compares with about 630,000 tons scheduled for shipment this quarter. Prices on the latest tonnage are the same as those recently prevailing.

Trading in domestic market continues slack, but prices have been advanced $1 a ton on No. 2 heavy melting to $29, and on No. 2 bundles to $20. The increases result largely from scarce supplies due to shipments abroad. However, some light trading in both items is reported.

Leading pipe shops recently covered their cast scrap needs for December at prices that applied on November shipments.

• **New York**—Except for a reduction of $5 a ton on 18-8 borings and turnings to $70-$75, brokers' buying prices are unchanged. Domestic demand for steel scrap is dull, with the flow of tonnage abroad the major sustaining factor. The market on borings and turnings and low phos structurals and plates continues nominal.

• **Cleveland**—Auto list prices are little changed from those at the start of November. Observers think the market is bumping bottom. The attractive prices prevailing ($23-$24 on No. 1 heavy melting) may induce consumers to lean more heavily on scrap than hot metal in coming weeks. It's reported that considerable Detroit auto scrap is finding its way to Youngstown open hearths; some furnaces are reportedly using a scrap charge as high as 65 per cent.

• **Detroit**—Great Lakes Steel Div., National Steel Corp., has been in the market for a small tonnage of No. 2 bundles. There also has been a little activity on No. 1 bundles, but prices are holding, and there are no signs of an immediate upturn. Rumors are circulating that the mills will have an extended shutdown over the holidays. Great Lakes has indicated it won't accept scrap shipments after Dec. 15.

• **Buffalo**—Dealers continue to hope that the mills will place some tonnage for December delivery. But mill production schedules are still sliding, and the need for scrap is

(*Please turn to Page* 135)

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(chilled iron)

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Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Dec. 7, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Dec. 7	$28.67
Nov. 30	28.83
Nov. Avg.	28.83
Dec. 1959	41.71
Dec. 1955	50.37

Based on No. 1 heavy melting grade at Pittsburgh. Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	21.00-22.00
No. 1 dealer bundles	27.00-28.00
No. 2 bundles	20.00-21.00
No. 1 busheling	26.00-27.00
No. 1 factory bundles	31.00-32.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	11.00-12.00
Short turnings	15.00-16.00
Cast iron borings	15.00-16.00
Cut structurals:	
2 ft and under	31.00-32.00
3 ft and under	30.00-31.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	34.00-35.00
Electric furnace bundles	32.00-33.00

Cast Iron Grades (F.o.b. shipping point

No. 1 cupola	31.00-32.00
Stove plate	27.00-28.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	31.00-32.00
Drop broken machinery	41.00-42.00

Railroad Scrap

No. 1 R.R. heavy melt.	*33.00-34.00*
Rails, 2 ft and under	*48.00-49.00*
Rails, 18 in. and under	*49.00-50.00*
Random rails	42.00-43.00
Angles, splice bars	36.00-37.00
Railroad specialties	*38.00-39.00*
Rails, rerolling	*55.00-56.00*

Stainless Steel Scrap

18-8 bundles & solids	175.00-180.00
18-8 turnings	95.00-100.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	*26.00-27.00*
No. 1 hvy melt., dealer	24.00-25.00
No. 2 hvy melting	22.00-23.00
No. 1 factory bundles	*29.00-30.00*
No. 1 dealer bundles	25.00-26.00
No. 2 bundles	16.00-17.00
No. 1 busheling, indus.	*26.00-27.00*
No. 1 busheling, dealer	24.00-25.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	13.00-14.00
Shovel turnings	13.00-14.00
Cast iron borings	13.00-14.00
Cut structurals, 3 ft	30.00-31.00
Punchings & plate scrap	32.00-33.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Stove plate	30.00-31.00
Unstripped motor blocks	28.00-29.00
Clean auto cast	41.00-42.00
Drop broken machinery	41.00-42.00

Railroad Scrap

No. 1 R.R. heavy melt.	28.00-29.00
R.R. malleable	40.00-41.00
Rails, 2 ft and under	42.00-43.00
Rails, 18 in. and under	43.00-44.00
Angles, splice bars	37.00-38.00
Axles	48.00-49.00
Rails, rerolling	46.00-47.00

Stainless Steel Scrap

18-8 bundles, solids	160.00-165.00
18-8 turnings	90.00-95.00
430 bundles & solids	75.00-80.00
430 turnings	40.00-45.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	17.00-18.00
No. 2 heavy melting	13.00-14.00
No. 1 bundles	19.00-20.00
No. 2 bundles	10.00-11.00
No. 1 busheling	16.00-17.00
Machine shop turnings	5.00-6.00
Mixed borings, turnings	5.00-6.00
Shovel turnings	6.00-7.00

Cast Iron Grades

No. 1 cupola	28.00-29.00
Stove plate	22.00-23.00
Heavy breakable	21.00-22.00
Unstripped motor blocks	17.00-18.00
Charging box cast	23.00-24.00
Clean auto cast	34.00-35.00

CLEVELAND

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00†
No. 1 factory bundles	27.00-28.00
No. 1 bundles	23.00-24.00
No. 2 bundles	16.00-17.00
No. 1 busheling	23.00-24.00
Machine shop turnings	10.00-11.00
Shovel turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Cast iron borings	14.00-15.00
Cut foundry steel	28.00-29.00
Cut structurals, plate 2 ft and under	31.00-32.00
Low phos. punchings & plate	26.00-27.00
Alloy free, short shovel turnings	14.00-15.00
Electric furnace bundles	24.00-25.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Charging box cast	24.00-25.00
Heavy breakable cast	26.00-27.00
Stove plate	34.00-35.00
Unstripped motor blocks	28.00-29.00
Brake shoes	35.00-36.00
Clean auto cast	42.00-43.00
Burnt cast	30.00-31.00
Drop broken machinery	42.00-43.00

Railroad Scrap

R.R. malleable	42.00-43.00
Rails, 2 ft and under	45.00-46.00
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	38.00-39.00
Cast steel	32.00-33.00
No. 1 railroad cast	42.00-43.00
Railroad specialties	37.00-38.00
Angles, splice bars	36.00-37.00
Rails, rerolling	51.00-52.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	150.00-155.00
18-8 turnings	65.00-70.00
430 clips, bundles, solids	65.00-70.00
430 turnings	10.00-20.00

YOUNGSTOWN

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	21.00-22.00
No. 1 busheling	26.00-27.00
No. 1 bundles	26.00-27.00
No. 2 bundles	20.00-21.00
Machine shop turnings	12.00-13.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Low phos.	27.00-28.00
Electric furnace bundles	27.00-28.00

Railroad Scrap

No. 1 R.R. heavy melt.	*29.50-30.50*

BUFFALO

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 2 bundles	16.00-17.00
No. 1 busheling	23.00-24.00
Shovel turnings	13.00-14.00
Machine shop turnings	9.00-10.00
Cast iron borings	11.00-12.00
Low phos. structurals and plates, 2 ft and under	33.00-34.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	*36.00-37.00*
No. 1 machinery	*43.00-44.00*

Railroad Scrap

Rails, random lengths	36.00-37.00
Rails, 3 ft and under	42.00-43.00
Railroad specialties	35.00-36.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	22.50-23.50
No. 2 heavy melting	19.50-20.50
No. 1 bundles	*23.50-24.50*
No. 2 bundles	15.00-16.00
No. 1 busheling	*22.50-23.50*
Machine shop turnings	8.00-9.00
Mixed borings, turnings	8.00-9.00
Shovel turnings	10.00-11.00
Cast iron borings	10.00-11.00
Low phos. 18 in.	31.00-32.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Heavy breakable cast	28.00-29.00
Charging box cast	34.00-35.00
Drop broken machinery	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	28.00-29.00
Rails, 18 in. and under	44.00-45.00
Rails, random lengths	36.00-37.00

PHILADELPHIA

No. 1 heavy melting	34.00
No. 2 heavy melting	*29.00*
No. 1 bundles	35.00
No. 2 bundles	*20.00*
No. 1 busheling	35.00
Electric furnace bundles	36.00
Mixed borings, turnings	14.00†
Shovel turnings	18.00
Machine shop turnings	13.00
Heavy turnings	25.00†
Structurals & plates	37.00-39.00
Couplers, springs, wheels	37.00
Rail crops, 2 ft & under	47.00-49.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	37.00
Drop broken machinery	47.00-48.00
Malleable	46.00†

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	18.00-19.00
No. 1 bundles	27.00-28.00
No. 2 bundles	13.00-14.00
Machine shop turnings	4.00-4.50†
Mixed borings, turnings	4.50-5.00†
Shovel turnings	6.00-7.00†
Low phos. structurals & plates	31.00-32.00†

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	23.00-24.00
Heavy breakable	28.00-29.00

Stainless Steel

18-8 sheets, clips, solids	145.00-150.00
18-8 borings, turnings	*70.00-75.00*
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	50.00-55.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 1 busheling	23.00-24.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	30.00-30.50
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	28.00-29.00
No. 2 bundles	20.00-21.00
No. 1 busheling	29.00-30.00
Cast iron borings	10.00-11.00
Machine shop turnings	15.00-16.00
Shovel turnings	18.00-19.00
Bar crops and plate	36.00-37.00
Structurals & plate	36.00-37.00
Electric furnace bundles	28.00-29.00
Electric furnace:	
3 ft and under	31.00-32.00
2 ft and under	33.00-34.00

Cast Iron Grades

No. 1 cupola	45.00-46.00
Stove plate	45.00-46.00
Unstripped motor blocks	32.00-33.00
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00
Rails, 18 in. and under	44.00-45.00
Rails, random lengths	38.00-39.00
Angles, splice bars	37.00-38.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	27.00
No. 2 heavy melting	25.00
No. 1 bundles	28.00
No. 2 bundles	18.00
No. 1 busheling	28.00
Machine shop turnings	7.00
Shovel turnings	9.00

Cast Iron Grades

No. 1 cupola	36.00
Charging box cast	33.00
Heavy breakable cast	31.00
Unstripped motor blocks	33.00
Clean auto cast	39.00
Stove plate	34.00

Railroad Scrap

No. 1 R.R. heavy melt.	28.00
Rails, random lengths	34.00†
Rails, rerolling	44.00
Rails, 18 in. and under	38.00
Angles, splice bars	32.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	29.00
No. 1 bundles	31.00-32.00
No. 2 bundles	18.00-19.00
Machine shop turnings	7.00-8.00†
Low phos. plate & structurals:	
3 ft	34.00
2 ft and under	36.00-37.00

Cast Iron Grades

No. 1 cupola	34.00-34.50
Heavy breakable	25.00
Foundry malleable	29.00-30.00†
Unstripped motor blocks	28.00-28.50

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00

LOS ANGELES

No. 1 heavy melting	*33.00**
No. 2 heavy melting	29.00*
No. 1 bundles	28.00†
No. 2 bundles	*21.00**
Machine shop turnings	12.00†
Shovel turnings	14.00†
Cast iron borings	12.00†
Cut structurals and plate 1 ft and under	41.00†

Cast Iron Grades

No. 1 cupola	*39.00*

Railroad Scrap

No. 1 R.R. heavy melt.	40.00†

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	*36.00*
No. 2 heavy melting	*34.00*
No. 2 bundles	19.00
Shovel turnings	13.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	*31.50*
Heavy breakable	31.00
Unstripped motor blocks	31.00
Stove plate (f.o.b. plant)	18.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	*36.00*
No. 1 (prepared for shears)	33.00
No. 1 hvy (unprepared)	33.00
No. 2 heavy melting	*34.00*
No. 2 hvy (unprepared)	30.00
No. 2 (prepared for shears)	28.00
No. 2 bundles	20.00
Shovel turnings	15.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	*31.50*
Heavy breakable cast	33.00
Unstripped motor blocks	30.00
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	32.00
No. 2 heavy melting	29.00
No. 1 bundles	27.00-28.00
No. 2 bundles	18.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	46.00-48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	25.80
No. 2 hvy melt, 2 ft & under	25.50
No. 1 bundles	25.80
No. 2 bundles	19.00
Mixed steel scrap	16.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	25.50
Unprepared	20.45
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	43.00

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*For export add $4 dock charges.

†Nominal.

‡F.o.b. Hamilton, Ont.

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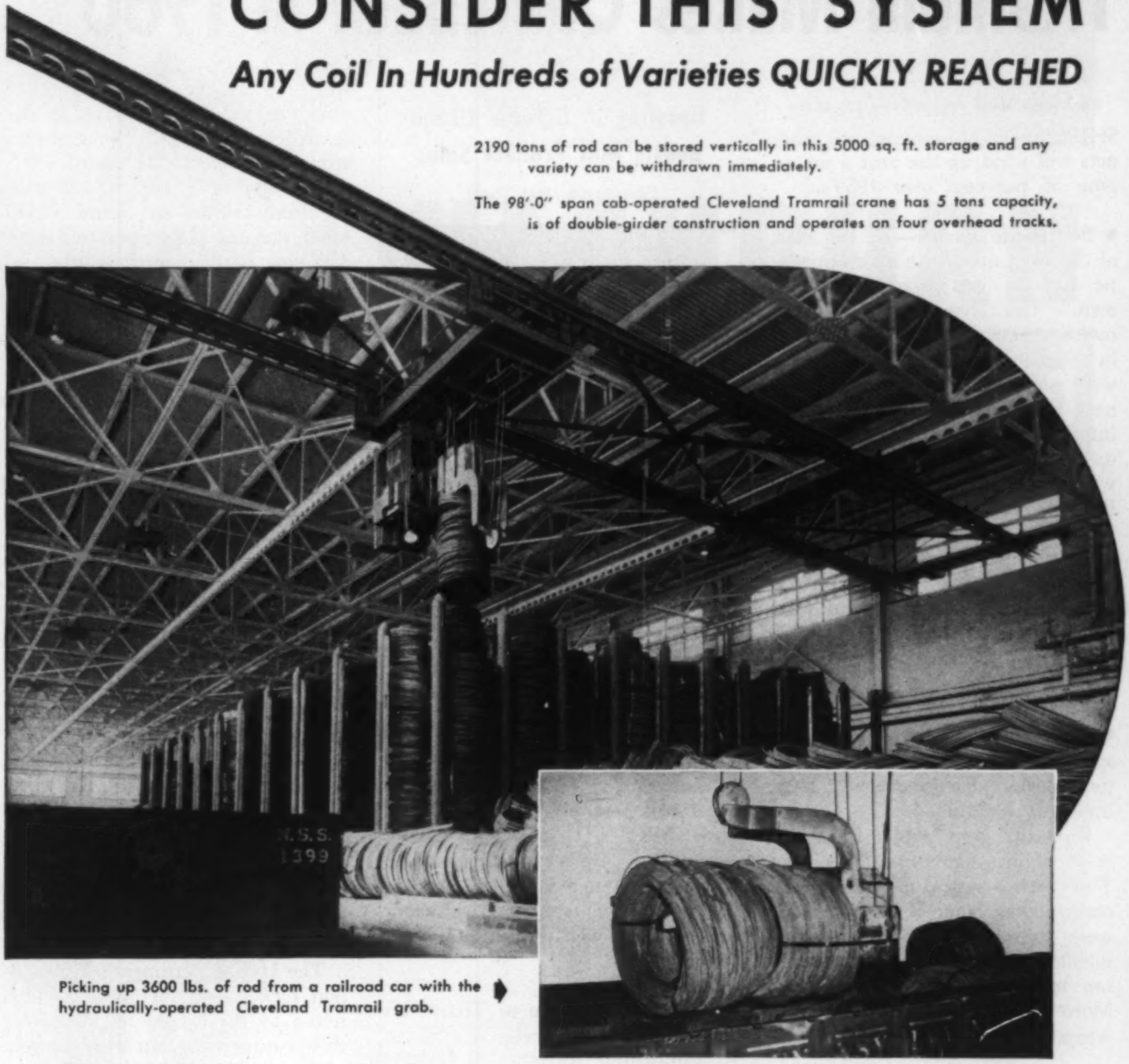
Any Coil In Hundreds of Varieties QUICKLY REACHED



2190 tons of rod can be stored vertically in this 5000 sq. ft. storage and any variety can be withdrawn immediately.

The 98′-0″ span cab-operated Cleveland Tramrail crane has 5 tons capacity, is of double-girder construction and operates on four overhead tracks.

Picking up 3600 lbs. of rod from a railroad car with the hydraulically-operated Cleveland Tramrail grab. ➧

SOME mighty outstanding advantages are provided in the rod storage at the modern plant of The Cleveland Cap Screw Co., Cleveland, by a Cleveland Tramrail vertical storage system which includes an overhead cab-operated crane and hydraulically-operated hairpin hook.

The system enables storing a great variety of sizes, heats and alloys in piles to heights of 17 feet and permits immediate access to any item without handling or disturbing others. Complete inventory can be maintained by the operator from his crane cab.

That is not all. The system has boosted efficiency tremendously by greatly reducing the man-hours of time required per ton. The crane operator alone takes care of the whole storage job. This includes picking coils from incoming railroad cars, placing into storage and removing from storage for delivery to production departments.

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Titanium Makes Comeback in 1960

Nonferrous Metal Prices, Pages 134 & 135

SHIPMENTS of titanium mill products will wind up the year a whopping 56 per cent over 1959's.

• **Pessimistic Earlier**—At the start of the year, about the most optimistic forecast was "we'll hold our own." The Department of Commerce predicted a 10 per cent slump in shipments. By midyear, there were some faint signs of bullishness. By late September, as official information on third quarter shipments began to trickle in, forecasts were lifted to a 10 per cent gain. But full realization of how well the industry has done didn't come until the last couple of weeks.

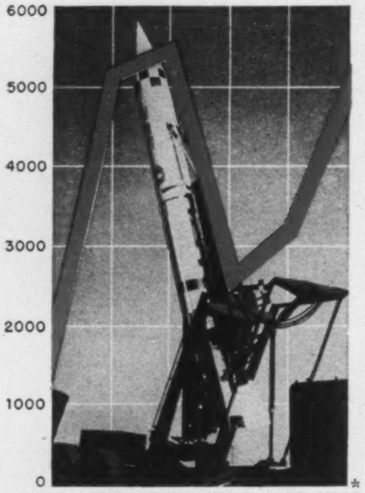
Shipments now look like this: First quarter, 990 tons; second quarter, 1150 tons; third quarter, 1280 tons; and fourth quarter, 1580 tons. Total: 5000 tons vs. 3200 in 1959.

• **Why the Upswing?**—Titanium's spurt can be credited to two factors: 1. More defense usage. 2. Some inventory building.

Primarily responsible: More aircraft engines were built this year. There was a stepup in fighter plane construction. Some B-52s and B-58s were constructed. Additional Atlas missiles were produced, and titanium moved into the Titan ICBM. More metal was consumed in weapon testing.

Upswing in Defense Usage Boosts Mill Product Sales

(Shipments, Net Tons)



* Estimated.
Source: Business & Defense Services Administration.

Titanium consumption for the year will probably break down this way: Missiles, 15 per cent; civilian aircraft, 10 per cent; chemical industry and miscellaneous uses, 2 per cent. The remainder, or about 73 per cent, went into military aircraft.

• **Feast and Famine** — Titanium's short history has been one of an on-again, off-again market as defense demands shifted. Demand shot straight up from 1950 until 1957. Then, after 1957 started off with the best quarter on record (2550 tons), demand plummeted to a mere 350 tons in the fourth quarter. In 1958, the industry operated at a low level. Sales began to improve last year as the missile business perked up and a few more aircraft were built.

• **Outlook for '61**—Defense buying is so uncertain titanium men still don't know if next year will be a boom or a bust. Metalmen look for a continued increase in demand from the chemical industry, with an outside chance that 100 tons of metal will go to that market. Manned aircraft will continue to account for the bulk of titanium purchased, with the missile market perhaps rising to about 20 per cent of sales.

The price outlook is hazy, but any move will be down. The composite price index now stands at $6.97 a pound compared with $7.22 a year ago.

NONFERROUS PRICE RECORD

	Dec. 7 Price	Last Change	Previous Price	Nov. Avg	Oct. Avg	Dec., 1959 Avg
Aluminum	26.00	Dec. 17, 1959	24.70	26.000	26.000	25.300
Copper	30.00	Oct. 13, 1960	31.00–33.00	30.000	30.760	33.269
Lead	11.80	Dec. 21, 1959	12.30	11.800	11.800	12.338
Magnesium	35.25	Aug. 13, 1956	33.75	35.250	35.250	35.250
Nickel	74.00	Dec. 6, 1956	64.50	74.000	74.000	74.000
Tin	102.375	Dec. 7, 1960	102.50	103.359	103.445	99.130
Zinc	13.00	Jan. 8, 1960	12.50	13.000	13.000	12.500

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, East St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingot, 99.5+%, f.o.b. customer custody; MAGNESIUM, pig, 99.8%, Velasco, Tex.

Postscript on Nicaro

The U. S. government's $100 million nickel plant at Nicaro, Cuba, seized by the Castro regime earlier this year, is being run with the help of Russian technicians, it has been learned. For months prior to the seizure, rumor had it that Castro wanted to make a deal with the Soviets (who are believed to be nickel shy) for Nicaro's output.

No one is sure where the nickel oxide sinter will turn up. It could all go to Russia, or some might show up on the European market, say nickel men.

Some 30 million lb of unsold Nicaro sinter, or about a year's supply, is in U.S. warehouses. After Dec. 31 the General Services Administration will take full charge of disposing of the remaining metal.

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TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 26.25-26.75, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment data, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.60 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.

Copper: Electrolytic, 30.00 deld.; custom smelters, 30.00; lake, 30.00 deld.; fire refined, 29.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-99 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $208-210 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $45-50 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 1950; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.50-5 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot, 102.375; prompt, 101.875.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75-2.85 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.10-4.00.

Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00. East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 14.35; special high grade, 14.50 deld. Diecasting alloy ingot No. 3, 16.25; No. 2, 16.75; No. 5, 16.50 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb, 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 25.00-26.00; No. 12 foundry alloy (No. 2 grade), 22.75; 5% silicon alloy, 0.60 Cu max., 24.00; 13 alloy, 0.60 Cu max., 24.00; 195 alloy, 25.75; 108 alloy, 23.25. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.75; grade 2, 22.50; grade 3, 21.50; grade 4, 21.00.

Brass Ingot: Red brass, No. 115, 28.25; tin bronze, No. 225, 38.00; No. 245, 32.50; high-leaded tin bronze, No. 305, 32.75; No. 1 yellow, No. 405, 23.50; manganese bronze, No. 421, 27.50.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.945, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.945, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 35.35; l.c.l., 35.98. Weatherproof, 20,000-lb lots, 36.30; l.c.l., 37.05.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt: traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R. .	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths

Diam	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 24.25-24.75; No. 2 heavy copper and wire, 22.50-23.00; light copper, 19.50-20.00; No. 1 composition red brass, 20.00-20.50; No. 1 com-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 30.00c)		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	55.13b	52.36c	....	56.32	26.000	26.000	25.250
Yellow Brass	49.27	34.88d	49.56	53.43	20.375	19.625	18.625
Low Brass, 80%	51.75	51.69	52.04	55.81	22.500	22.250	21.750
Red Brass, 85%	52.62	52.56	52.91	56.68	23.250	23.000	22.500
Com. Bronze, 90%	54.03	53.97	54.32	57.84	24.000	23.750	23.250
Manganese Bronze	57.77–57.82	51.42–51.46	61.69	....	19.250	19.000	18.375
Muntz Metal	52.14	47.45	....	....	19.475	19.125	18.625
Naval Brass	54.08	47.89	60.39	58.24	19.125	18.875	18.375
Silicon Bronze	60.45–60.48	59.64–59.67	59.74–59.77	78.89	25.500	25.250	24.500
Nickel Silver, 10%	64.68	67.01	66.76	....	25.125	24.875	12.562
Phos. Bronze, A-5% ...	75.70	76.20	75.45	77.63	27.125	26.875	25.875

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents pe rlb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

position turnings, 19.00-19.50; new brass clippings, 16.50-17.00; light brass, 13.50-14.00; heavy yellow brass, 14.50-15.00; new brass rod ends, 15.50-16.00; auto radiators, unsweated, 15.75-16.25; cocks and faucets, 16.50-17.00; brass pipe, 17.50-18.00.

Lead: Soft scrap lead, 7.75-8.00; battery plates, 3.00; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 23.00-24.00; old sheets 22.00-23.00; turnings, 16.50-17.50; rods, 22.00-23.00.

Nickel: Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

Zinc: Old zinc, 3.00-3.50; new diecast scrap, 4.25-4.50; old diecast scrap, 2.75-3.00.

Aluminum: Old castings and sheets, 11.00-11.50; clean borings and turnings, 6.00-6.50; segregated low copper clips, 13.00-13.50; segregrated high copper clips, 12.00-12.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 10.00-10.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.50-14.00; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.00; clean borings and turnings, 8.50; segregated low copper clips, 14.00; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 56.00; light scrap, 51.00; turnings and borings, 36.00.

Copper and Brass: No. 1 heavy copper and wire, 24.25; No. 2 heavy copper and wire, 23.50; light copper, 21.00; refinery brass (60% copper) dry copper content, 22.00.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 24.25; No. 2 heavy copper and wire, 23.50; light copper, 21.00; No. 1 composition borings, 20.25-21.50; No. 1 composition solids, 20.75-22.00; heavy yellow brass solids, 15.50-16.50; yellow brass turnings, 14.50-15.50; radiators, 16.50-17.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.04; oval, 43.50, 5000-10,000 lb; electrodeposited, 39.00, 2000-5000 lb lots; cast, 41.50, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 121.50; 200-499 lb, 120.00; 500-999 lb, 119.50; 1000 lb or more, 119.00.

Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,-000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.25; 2000-5900 lb, 13.25; 6000-11,900 lb, 13.00; 12,000-22,900 lb, 12.75; 23,000 lb or more, 12.25.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 80.10; 100-600 lb, 70.70; 700-1900 lb, 68.00; 2000-9900 lb, 66.10; 10,000 lb or more, 64.80.

Stannous Chloride (Anhydrous): 25 lb, 155.60; 100 lb, 150.70; 400 lb, 148.30; 800-19,900 lb, 107.40; 20,000 lb or more, 101.30.

Stannous Sulphate: Less than 50 lb, 140.70; 50 lb, 110.70; 100-1900 lb, 108.70; 2000 lb or more, 106.70.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(Concluded from Page 129)

declining. The mills also have plenty of stocks. Indications are that the large mills won't do any new buying until next year. Prices on cast iron grades of scrap dropped another $1 a ton last week on an order by a district user. The foundry paid $37 for cupola grade.

- **Cincinnati**—The market is quiet, but prices are firm. No. 1 heavy melting is quoted $22.50-$23.50. Little change in the prevailing market pattern is expected until next quarter. One area mill is producing enough home scrap at a 50 per cent operating pace to support production without dipping into scrap reserves. Foundry buying of scrap continues slow.

- **St. Louis**—A slightly stronger undertone is noted in the market, but prices are unchanged. Demand continues spotty, but some mills have been using up their stocks steadily and now are reported at a point where they may have to enter the market for tonnage. Over-all, however, the market situation is little changed from that prevailing in recent weeks. Dealers are not bringing in much new tonnage to their yards because of the low prices. For the same reason, railroad offerings are light.

- **Birmingham** — Prices are unchanged, but the market continues weak. No change in the situation is anticipated the rest of this month. Some inquiries are reported circulating, asking for prices on electric furnace material 2 ft and under.

- **Houston** — Domestic prices on scrap are firm in the Gulf Coast market. Mill and foundry demand is poor, but dealers are hoping for a surge in buying early next year. Word is out that the Japanese plan to buy 130,000 more tons of scrap from the U. S. in January, February, and March than they purchased in the last three months of 1960.

- **Seattle**—Prices have dropped $1 to $2 a ton farther. Most traders think the bottom has about been reached and are more optimistic for the near future. The recent drop was due largely to withdrawal of the mills from the market because of the personal property tax at yearend on stocks, in some cases amounting to 6 per cent.

The export section is temporarily quiet, but the outlook is encouraging. Japan has contracted for 95 cargoes to be shipped from Atlantic, Gulf, and Pacific Coast ports in the first quarter of next year, an increase of 30 cargoes over the last quarterly award.

- **San Francisco**—Japanese interests have increased their commitments for steel scrap during the first quarter of next year. Local demand continues inactive.

- **Los Angeles**—The market was untested last week. Dealers are quoting a wide range of prices, but they're finding few takers. Collections have slowed noticeably, due to the depressed level of prices.

Scrap Exports Up Sharply In First Nine Months

Iron and steel scrap exports in September totaled 655,299 net tons, valued at $21,375,062, reports the U. S. Commerce Department. That compares with 861,212 tons, valued at $29,158,881, in August this year and 426,527 tons, valued at $14,573,663, in September, 1959.

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ALL AROUND FORGE SUPERVISOR capable of managing small forge shop, experience in design, methods, cost reduction and organization. Reply Box 889, STEEL, Penton Bldg., Cleveland 13, Ohio.

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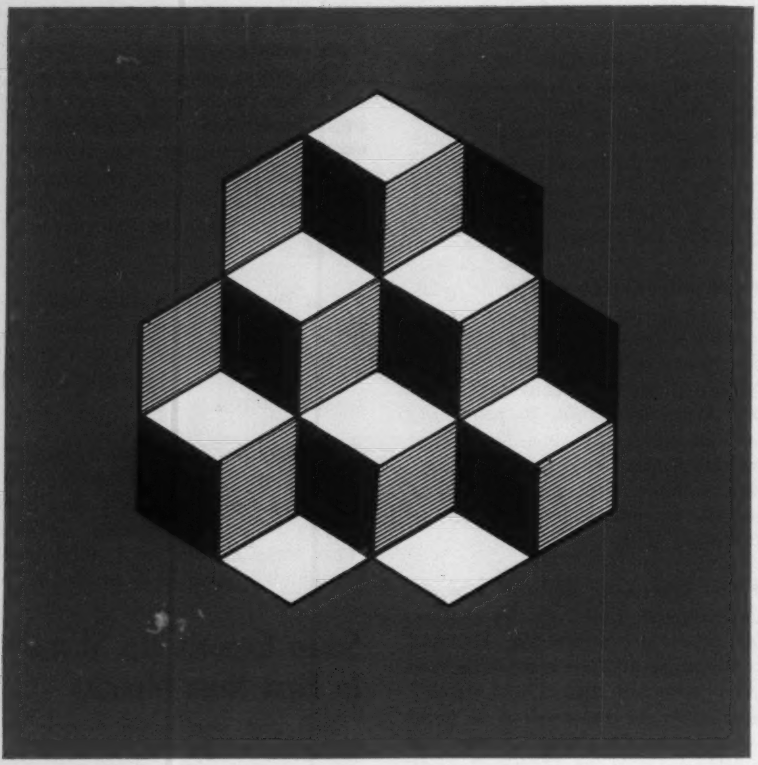

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Write today for this new handbook of blast cleaning abrasive performance. It's full of charts and facts you can use to help cut abrasive consumption, reduce cleaning costs. Write to Wheelabrator Corp., 509 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 409, Scarborough, Ont.

WHEELABRATOR
STEEL ABRASIVES

Scrap exports in the first nine months this year were 5,275,764 net tons, valued at $173,751,890, vs. 3,373,459 tons, valued at $111,777,274, in the same 1959 period. Exports during September: Canada, 45,977 tons; Mexico, 31,134; Brazil, 27; Sweden, 13,791; United Kingdom, 43,442; Belgium-Luxembourg, 2887; France, 10,500; West Germany, 76,456; Italy, 93,950; Pakistan, 21; Taiwan, 16,826; Japan, 201,501.

In the first nine months exports were made to: Canada, 500,634 tons; Mexico, 338,172; Colombia, 31; Brazil, 27; Argentina, 548; Sweden, 201,202; United Kingdom, 191,276; Netherlands, 31,360; Belgium-Luxembourg, 2887; France, 56,873; West Germany, 335,250; Switzerland, 3365; Italy, 744,329; Israel, 8099; Hong Kong, 97,529; Taiwan, 85,918; Japan, 2,553,506; all other, 124,758.

Scrap imports in September were 15,439 tons, valued at $486,775, vs. 14,494 tons, valued at $437,169 in August, and 16,388 tons, valued at $571,692, in September, 1959. Imports in the first nine months were 143,052 tons, valued at $5,070,556, vs. 232,548 tons valued at $8,733,100 in the same 1959 period.

Imports by country of origin in the first nine months: Canada, 125,098 tons; total North America, 129,044; Sweden, 11; United Kingdom, 244; Netherlands, 3991; Belgium-Luxembourg, 2882; France, 121; other Europe, 6720; total Europe, 13,909; Japan, 99; Mexico, 167; Cuba, 2614; French W. Indies, 1165 tons.

Mill Steel Shipments in October Little Changed

Mill shipments of finished steel in October totaled 4,943,623 net tons vs. 4,983,228 in the preceding month and 1,419,297 in October, 1959 (when shipments were curbed by the strike), reports the American Iron & Steel Institute. Shipments in the first ten months this year were 62,543,780 net tons vs. 56,374,170 in the same 1959 period.

Market outlets in the first ten months this year were led by the automotive industry with 12,721,659 tons, followed by the warehouses (11,050,398 tons), construction (8,483,902), containers (5,791,950), and machinery, industrial equipment, and tools (3,490,185).

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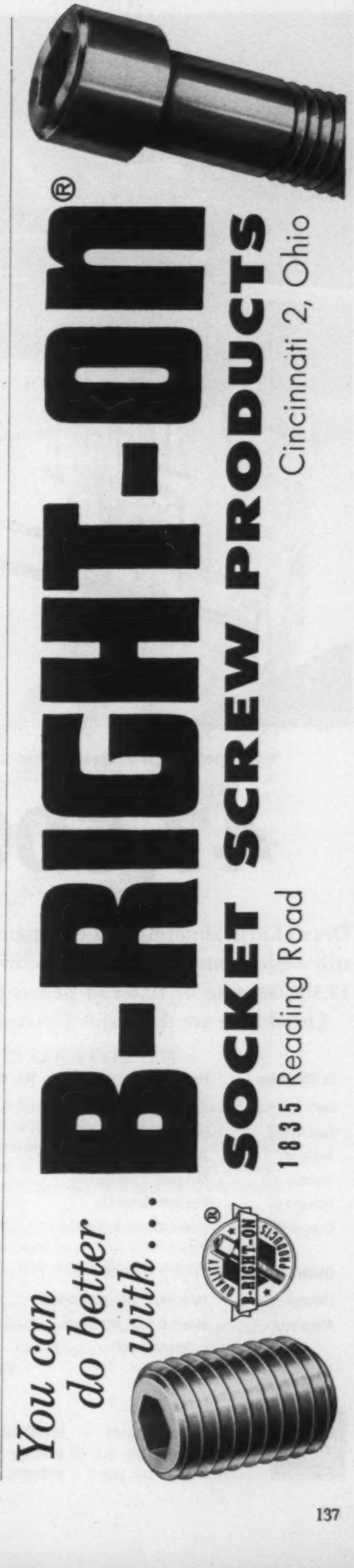

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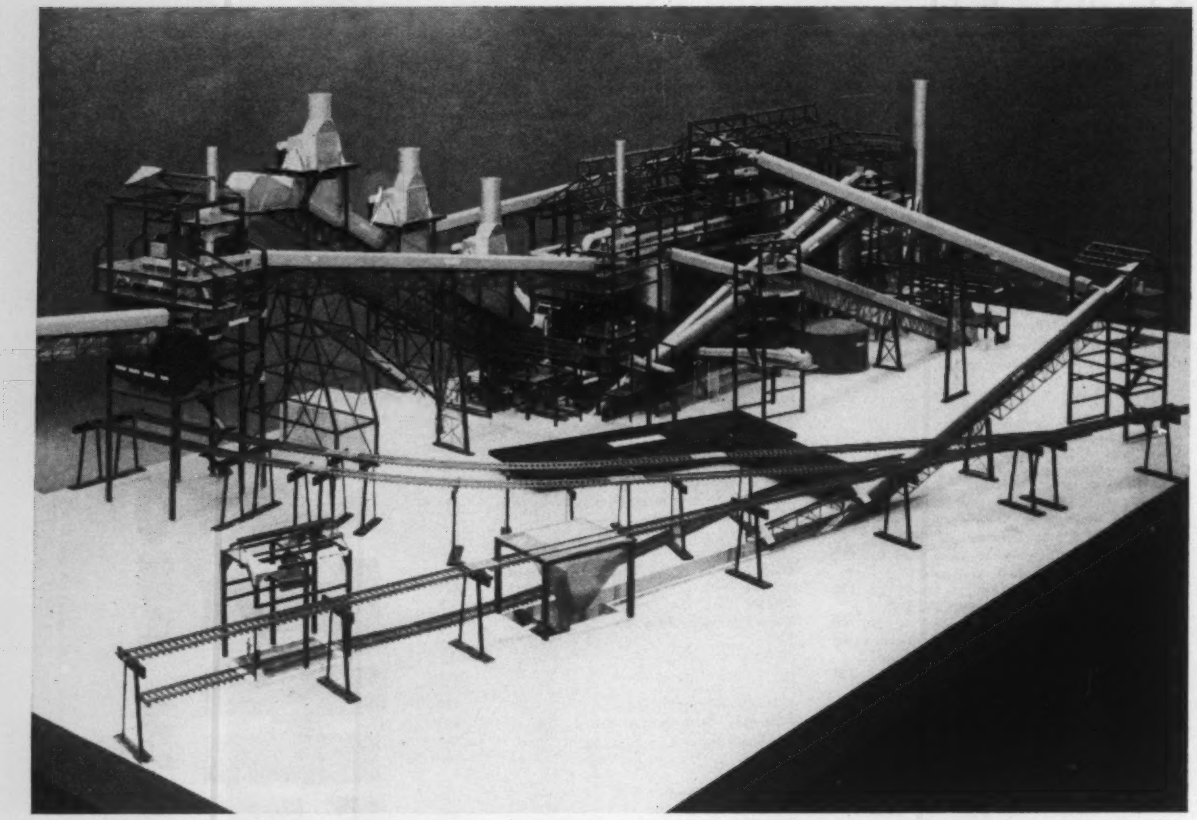

Scale model of the newest Dravo-Lurgi sintering plant, now under construction for Interlake Iron Corporation.

47,500 tons per day

Dravo-Lurgi Sintering and Pelletizing Plants, some still under construction, will produce in excess of 15,500,000 tons of sinter or pellets per year.

Listed here are the major Dravo-Lurgi projects:

In Operation	For	No. Machines	Capacity
Gary	United States Steel Corp.	3	15,000 tpd
Saxonburg	United States Steel Corp.	3	15,000 tpd
Ashland	Armco Steel Corp.	1	2,400 tpd
Trenton #1	McLouth Steel Co.	1	2,100 tpd
Trenton #2	McLouth Steel Co.	1	2,100 tpd
Copper Cliff, Ont.	International Nickel Co.	1	1,100 tpd
Under Construction			
Chicago	Interlake Iron Corporation	1	3,300 tpd
Aliquippa	Jones & Laughlin Steel Corporation	1	6,500 tpd
		Total:	47,500 tpd

In addition to these complete plants, Dravo has built sinter coolers of several types for a number of existing sinter machines. These coolers are designed to reduce sinter temperatures at the maximum rate consistent with minimum shattering, and unload the cooled sinter without further breaking.

This extensive experience with sintering and pelletizing plant design and construction can be brought to bear on your specific requirements. We will be glad to discuss the latest techniques in ore agglomeration with you or your staff. Write or phone Dravo Corporation, Pittsburgh 22, Pa.

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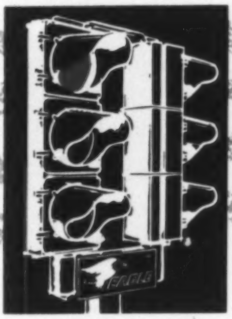

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Each Gamewell division will go on serving its customers just as it has in the past, with the same people and the same policies. If your question relates to fire alarm systems, call Gamewell. For traffic signals or timers, it's Eagle Signal. For fire fighting equipment, it's still Rockwood Sprinkler.

All this makes Bliss' stake in America larger than ever before. It has gone far beyond the expansion and modernization of manufacturing industry. It lies in our expanding suburban areas ... in urban growth and redevelopment ... in our spreading highway system. It's an exciting, interesting and rewarding field.

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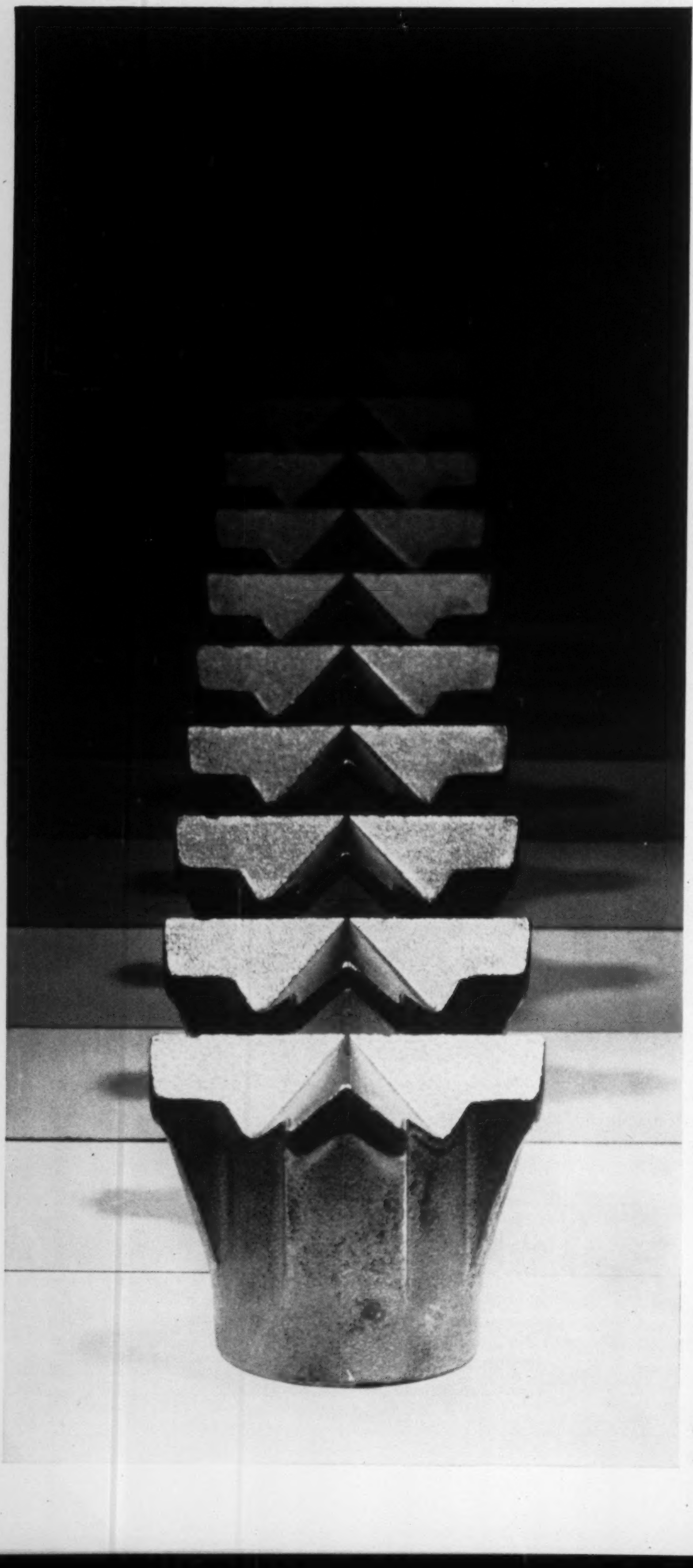

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